COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DRAFT* PERMIT** ***April 30, 2019
TO WITHDRAW GROUNDWATER IN THE EASTERN SHORE GROUNDWATER MANAGEMENT AREA

Permit Number: GW0073700

Effective Date: Xxxxxxx XX, 2019

Expiration Date: Xxxxxxx XX, 2034

Pursuant to Section 62.1-256 of the Ground Water Management Act of 1992 (Chapter 25, Title 62.1 of the Code of Virginia) and the Groundwater Withdrawal Regulations (Regulations) (9VAC25-610-10 *et seq*.), the State Water Control Board (Board) hereby authorizes the Permittee to withdraw and use groundwater in accordance with this permit.

Permittee Goodman Poultry Farms, LLC

Facility Tanner Farm

Facility Address 21570 Fair Oaks Road

Melfa, VA 23410

The Permittee's authorized groundwater withdrawal shall not exceed:

8,000,000 gallons per year,
2,500,000 gallons per month.

The permitted withdrawal will be used to provide an agricultural water supply. Other uses are not authorized by this permit.

The Permittee shall comply with all conditions and requirements of the permit.

By direction of the State Water Control Board, this Permit is granted by:

Signed_____ Date _____

Director, Office of Water Supply

This permit is based on the Permittee's application submitted on December 11, 2017, and subsequently amended to include supplemental information provided by the Permittee. The following are conditions that govern the system set-up and operation, monitoring, reporting, and recordkeeping pertinent to the Regulations.

Part I
Operating Conditions

A. Authorized Withdrawal

1. The withdrawal of groundwater shall be limited to the following wells identified in the table below. Withdrawals from wells not included in Table 1 are not authorized by this permit and are therefore prohibited. 9VAC25-610-140.A

Table 1

Owner Well Name	DEQ Well #	Well Depth (ft)	Screen Intervals	Aquifer	Latitude	Longitude	Datum
Well 1	100-01422	238	215-238	Middle Yorktown-Eastover	37° 39' 12.827"	75° 42' 04.09"	WGS84
Well 2	100-01423	238	223-238	Middle Yorktown-Eastover	37° 39' 13.283"	75° 42' 04.259"	WGS84
Well 3	100-01424	220	205-220	Middle Yorktown-Eastover	37° 39' 14.572"	75° 42' 01.774"	WGS84
Well 4	100-01425	220	205-220	Middle Yorktown-Eastover	37° 39' 14.905"	75° 42' 01.810"	WGS84
Well 5	100-01426	225	215-225	Middle Yorktown-Eastover	37° 39' 16.230"	75° 41' 59.370"	WGS84
Well 6	100-01427	225	215-225	Middle Yorktown-Eastover	37° 39' 16.612"	75° 41' 59.470"	WGS84

2. Any actions that result in a change to the well operation, construction, or pump intake setting of wells included in this permit must be pre-approved by the Department of Environmental Quality (Department) in writing prior to implementing the change and a revised GW-2 Form must be submitted to the Department within 30 days after the physical construction of a well is altered or the pump intake setting has been changed. If changes are a result of an emergency, notify the Department within 5 days from the change. 9VAC25-610-140.C

B. Pump Intake Settings

1. The Permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a groundwater source or lower than the bottom of an unconfined aquifer that a well utilizes as a groundwater source in order to prevent dewatering of the aquifer, loss of inelastic storage, or damage to the aquifer from compaction. 9VAC25-610-140.A.6

2. Pump settings in individual wells are limited as follows. Any change in the pump setting must receive prior approval by the Department.

Owner Well Name	DEQ Well #	Max Pump Setting (feet below land surface)
Well 1	100-01422	195

Well 2	100-01423	195
Well 3	100-01424	195
Well 4	100-01425	195
Well 5	100-01426	195
Well 6	100-01427	195

C. Reporting

1. Water withdrawn from each well shall be recorded consistently at the end of each month and reported to the Office of Water Supply, in paper or electronic format, on a form provided by the Department by the tenth (10^{th}) day of each January, April, July and October for the respective previous calendar quarter. Records of water use shall be maintained by the Permittee in accordance with Part III.F, 1 through 5 of this permit. 9VAC25-610-140.A.9

2. The Permittee shall report any amount in excess of the permitted withdrawal limit by the fifth (5th) day of the month following the month when such a withdrawal occurred. Failure to report may result in compliance or enforcement activities. 9VAC25-610-140.C

3. The following is a summary of reporting requirements for specific facility wells:

Owner Well Name	DEQ Well #	Reporting Requirements
Well 1	100-01422	Water Use
Well 2	100-01423	Water Use
Well 3	100-01424	Water Use
Well 4	100-01425	Water Use
Well 5	100-01426	Water Use
Well 6	100-01427	Water Use

D. Water Conservation and Management Plan

1. The Water Conservation and Management Plan (WCMP) submitted in the revised application received March 15, 2018 and subsequently amended and then approved by the Department is incorporated by reference into this permit and shall have the same effect as any condition contained in this permit and may be enforced as such.

2. By the end of the first year of the permit cycle [*date*] the Permittee shall submit a detailed description of their leak detection and repair program activities and documentation to the Department that these activities have been conducted. This documentation shall include frequency of the activities completed and the findings and results of the activities during the first year of the permit term. 9VAC25-610-100.B.1.b, 2.b, or 3.b

3. As soon as completed but not later than the end of the second year of the permit cycle [*date*], the Permittee shall submit to the Department results of a 12 month audit of the total amount of groundwater used in the distribution system and the separate amounts used for drinking and cooling. This audit report shall include the flock cycle start and end dates during the year, and any necessary changes to the leak detection and repair program or operations that affected water use. 9VAC25-610-100.B.1.b, 2.b, or 3.b

4. A report on the plan's effectiveness in maintaining or reducing water use and a summary of

proposed revisions to the WCMP to address any elements that can be improved based on operations to date shall be submitted by the end of years five [*date*] and ten [*date*] of the permit term. These reports shall include as appropriate: 9VAC25-610-140.C

a. Any new water saving equipment installed or water saving processes adopted;
b. A summary of the operation of the cooling system for the houses during the report period including what months the cooling system was operated;
c. Evaluation of the leak detection and repair program with a summary of any significant leaks found and repaired; and
d. A summary of the flock cycles and overall water use patterns for each year covered by the report.

5. If revisions or additions to the plan are necessary an updated WCMP shall be submitted to the Department for approval along with the report prior to implementation of the revised plan

6. Records of activities conducted pursuant to the WCMP are to be submitted to DEQ upon request.

E. Mitigation Plan

The Mitigation Plan approved on June 18, 2018 by the Department is incorporated by reference into this permit and shall have the same effect as any condition contained in this permit and may be enforced as such. 9VAC25-610-110.D.3.g

F. Well Tags

1. Each well that is included in this permit shall have affixed to the well casing, in a prominent place, a permanent well identification plate that records, at a minimum, the DEQ well identification number, the groundwater withdrawal permit number, the total depth of the well, and the screened intervals in the well. Such well identification plates shall be in a format specified by the Board and are available from the Department. 9VAC25-610-140.A.12

2. Well tags shall be affixed to the appropriate well casing within 30 days of receiving the tags from the Department. The accompanying well tag installation certification form shall be returned to the Department within 60 days of receipt of the tags. 9VAC25-610-140.C

Part II
Special Conditions

Pursuant to 9VAC25-610-140.B and C, the following Special Conditions apply to this permit in order to protect the public welfare, safety, and health or conserve, protect and help ensure the beneficial use of groundwater.

A. Meter Installation Verification/Correction

If notified by DEQ through an inspection report that meters meeting the requirements set forth in Part III Condition I of this permit have not been correctly installed on each production well in such a manner as to record total withdrawals from the well including both cooling water and drinking water, the Permittee

shall correct any identified meter issues within 60 days of notification.

B. Alternative Source Investigation

1. By September 30, 2022 the Permittee shall conduct an investigation of the surficial aquifer (Columbia) to evaluate the ability of the surficial aquifer to provide all or part of the water supply needs for the facility. The investigation shall include water quality and pump test data collected from a surficial aquifer test well constructed on-site with Department oversight to ensure the well is properly screened in the surficial aquifer. A geophysical log shall be obtained from the surficial aquifer test well per Part III.K of the permit unless a geophysical log collected from an existing production well is accepted by DEQ as representing the Columbia aquifer at the test well location. An existing well screened in the surficial aquifer located on or near the facility property may be used where approved by DEQ as an alternative. An existing well must have sufficient well construction information available to verify it is screened in the surficial aquifer and properly constructed in order to be considered.

2. A report on the results of the investigation shall be provided to DEQ by March 31, 2023.

Part III
General Conditions

A. Duty to Comply

The Permittee shall comply with all conditions of the permit. Nothing in this permit shall be construed to relieve the permit holder of the duty to comply with all applicable federal and state statutes, regulations and prohibitions. Any permit violation is a violation of the law and is grounds for enforcement action, permit termination, revocation, modification, or denial of a permit application. 9VAC25-610-130.A

B. Duty to Cease or Confine Activity

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the activity for which a permit has been granted in order to maintain compliance with the conditions of the permit. 9VAC25-610-130.B

C. Duty to Mitigate

The Permittee shall take all reasonable steps to avoid all adverse impacts that may result from this withdrawal as defined in 9VAC25-610-10 and provide mitigation of the adverse impact when necessary as described in 9VAC25-610-110.D.3.g. 9VAC25-610-130.C

D. Inspection, Entry, and Information Requests

Upon presentation of credentials, the Permittee shall allow the Board, the Department, or any duly authorized agent of the Board, at reasonable times and under reasonable circumstances, to enter upon the Permittee's property, public or private, and have access to, inspect and copy any records that must be kept as part of the permit conditions, and to inspect any facilities, well(s), water supply system,

operations, or practices (including sampling, monitoring and withdrawal) regulated or required under the permit. For the purpose of this section, the time for inspection shall be deemed reasonable during regular business hours. Nothing contained herein shall make an inspection time unreasonable during an emergency. 9VAC25-610-130.D

E. Duty to Provide Information

The Permittee shall furnish to the Board or Department, within a reasonable time, any information that the Board may request to determine whether cause exists for modifying or revoking, reissuing, or terminating the permit, or to determine compliance with the permit. The Permittee shall also furnish to the Board or Department, upon request, copies of records required to be kept by regulation or this permit. 9VAC25-610-130.E

F. Monitoring and Records Requirements

1. The Permittee shall maintain a copy of the permit on-site and/or shall make the permit available upon request. 9VAC25-610-130.E

2. Monitoring of parameters shall be conducted according to approved analytical methods as specified in the permit. 9VAC25-610-130.F.1

3. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. 9VAC25-610-130.F.2

4. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart or electronic recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three years from the date of the expiration of a granted permit. This period may be extended by request of the Board at any time. 9VAC25-610-130.F.3

5. Records of monitoring information shall include as appropriate: 9VAC25-610-130.F.4

    a. the date, exact place and time of sampling or measurements;

    b. the name(s) of the individual(s) who performed the sampling or measurements;

    c. the date the analyses were performed;

    d. the name(s) of the individual(s) who performed the analyses;

    e. the analytical techniques or methods supporting the information, such as observations,

    f. readings, calculations and bench data used;

    g. the results of such analyses; and

    h. chain of custody documentation.

G. Environmental Laboratory Certification

The Permittee shall comply with the requirement for certification of laboratories conducting any tests, analyses, measurements, or monitoring required pursuant to the State Water Control Law (§ 62.1-44.2 et seq.), Environmental Laboratory Certification Program (§ 2.2-1105et seq.), Certification for Noncommercial Environmental Laboratories (1VAC30-45), and/or Accreditation for Commercial Environmental Laboratories (1VAC30-46), and

a. Ensure that all samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. Conduct monitoring according to procedures approved under 40CFR Part 136 or alternative methods approved by the U.S. Environmental Protection Agency.

c. Periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements. (1VAC30-45-20)

H. Future Permitting Actions

1. A permit may be modified or revoked as set forth in Part VI of the Regulations. 9VAC25-610-290 and 9VAC25-610-130.G

2. If a Permittee files a request for permit modification or revocation, or files a notification of planned changes, or anticipated noncompliance, the permit terms and conditions shall remain effective until the Board makes a final case decision. This provision shall not be used to extend the expiration date of the effective permit. 9VAC25-610-130.G

3. Permits may be modified or revoked upon the request of the Permittee, or upon Board initiative, to reflect the requirements of any changes in the statutes or regulations. 9VAC25-610-130.G

4. The Permittee shall schedule a meeting with the Department prior to submitting a new, expanded or modified permit application. 9VAC25-610-85

5. A new permit application shall be submitted 270 days prior to the expiration date of this permit, unless permission for a later date has been granted by the Board, to continue a withdrawal greater than or equal to 300,000 gallons in any month while an application for a renewal is being processed. 9VAC25-610-96

6. A new permit application shall be submitted 270 days prior to any proposed modification to this permit that will (i) result in an increase of withdrawal above permitted limits; or (ii) violate the terms and conditions of this permit. 9VAC25610-96

7. The applicant shall provide all information described in 9VAC25-610-94 for any reapplication. 9VAC25-610-96.C

8. The Permittee must notify the Department in writing of any changes to owner and facility contact information within 30 days of the change. 9VAC25-610-140.C

I. Metering and Equipment Requirements

1. Each well and/or impoundment or impoundment system shall have an in-line totalizing flow meter to read gallons, cubic feet, or cubic meters installed prior to beginning the permitted use. Meters shall produce volume determinations within plus or minus 10% of actual flows. 9VAC25-610-140.7.A.b

    a. A defective meter or other device must be repaired or replaced within 30 days.

    b. A defective meter is not grounds for not reporting withdrawals. During any period when a meter is defective, generally accepted engineering methods shall be used to estimate withdrawals. The period during which the meter was defective must be clearly identified in the groundwater withdrawal report required by Part I, Subsection D of this permit. An alternative method for determining flow may be approved by the Board on a case-by-case basis.

2. Each well shall be equipped in a manner such that water levels can be measured during pumping and non-pumping periods without dismantling any equipment. Any opening for tape measurement of water levels shall have an inside diameter of at least 0.5 inches and be sealed by a removable plug or cap. The Permittee shall provide a tap for taking raw water samples from each permitted well. 9VAC25-610-140.A.7.e

J. Minor Modifications

1. A minor modification to this permit must be made to replace an existing well(s) or add an additional well(s) provided that the well(s) is screened in the same aquifer(s) as the existing well(s), and is in the near vicinity of the existing well(s), the total groundwater withdrawal does not increase, the area of impact does not increase, and the well has been approved by the Department prior to construction. 9VAC25-610-330.B.4 and 5

2. A minor modification to this permit must be made to combine withdrawals governed by multiple permits when the systems are physically connected as long as interconnection will not result in additional groundwater withdrawal and the area of impact will not increase. 9VAC25-610-330.B.6

3. Minor modifications to this permit must also be made to:

    a. Change an interim compliance date up to 120 days from the original compliance date, as long as the change does not interfere with the final compliance date. 9VAC25-610-330.B.7

    b. Allow for change in ownership when the Board determines no other change in the permit is necessary and the appropriate written agreements are provided in accordance with the transferability of permits and special exceptions. 9VAC25-610-320 and 9VAC25-610-330.B.8

    c. Revise a Water Conservation and Management Plan to update conservation measures being implemented by the Permittee that increase the amount of groundwater conserved. 9VAC25-610-330.B.9

K. Well Construction

At least 30 days prior to the scheduled construction of any well(s), the Permittee shall notify the Department of the construction timetable and receive prior approval of the well(s) location(s) and acquire the DEQ Well number. All wells shall be constructed in accordance with the following requirements.

1. A well site approval letter or well construction permit must be obtained from the Virginia Department of Health prior to construction of the well. 9VAC25-610-130.A

2. A complete suite of geophysical logs (Spontaneous Potential, Single Point Resistance, 16/64 Short and Long Normal, Natural Gamma) shall be completed for the well and submitted to the Department along with the corresponding completion report. 9VAC25-610-140.C

3. The Permittee shall evaluate the geophysical log and driller's log information to estimate the top of the target aquifer and; therefore, a depth below which the pump shall not be set. The Permittee's determination of the top of the target aquifer shall be submitted to the Department for review and approval, or approved on site by the Department's Groundwater Characterization staff, prior to installation of any pump. 9VAC25-610-140.A.6

4. The Permittee shall install gravel packs and grout in a manner that prevents leakance between aquifers. Gravel pack shall be terminated close to the top of the well screen(s) and shall not extend above the top of the target aquifer. 9VAC25-610-140.C

5. A completed GW-2 Form and any additional water well construction documents shall be submitted to the Department within 30 days of the completion of any well and prior to the initiation of any withdrawal from the well. 9VAC25-610-140.C. The assigned DEQ Well number shall be included on all well documents. 9VAC25-610-140.C

6. In addition to the above requirements, construction of a Water Level Monitoring State Observation Well (SOW) requires:

    a. The Permittee shall coordinate activities with the Department's Groundwater Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140.C

    b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140.C

    c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall not be required to install the equipment. 9VAC25-610-140.C

7. In addition to the above requirements, construction of a Chloride Monitoring SOW requires:

    a. The Permittee shall coordinate activities with the Department's Groundwater Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140.C

    b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140.C

    c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall not be required to install the equipment. 9VAC25-610-140.C

    d. Instrumentation to meet the requirements for continuous measurement of specific conductance from multiple levels within the well screen shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall not be required to install the equipment. 9VAC25-610-140.C

L. Permit Reopening

This permit may be reopened for the purpose of modifying the conditions of the permit as follows:

a. To meet new regulatory standards duly adopted by the Board. 9VAC25-610-140.A.11

b. When new information becomes available about the permitted withdrawal, or the impact of the withdrawal, which had not been available at permit issuance and would have justified the application of different conditions at the time of issuance. 9VAC25-610-310.B.1

c. When the reported withdrawal is less than 60% of the permitted withdrawal amount for a five year period. 9VAC25-610-310.B.2

d. If monitoring information indicates the potential for adverse impacts to groundwater quality or level due to this withdrawal. 9VAC25-610-140.C

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

PERMIT ISSUANCE FACT SHEET

Groundwater Withdrawal Permit Number: GW0073700
Application Date: December 11, 2017

The Department of Environmental Quality (Department or DEQ) has reviewed the application for a Groundwater Withdrawal Permit. Based on the information provided in the application and subsequent revisions, DEQ has determined that there is a reasonable assurance that the activity authorized by the permit is a beneficial use as defined by the regulations. Groundwater impacts have been minimized to the maximum extent practicable. The following details the application review process and summarizes relevant information for developing the Permit and applicable conditions.

Permittee / Legal Responsible Party

Name & Address:	Goodman Poultry Farms, LLC 124 Lake Dr. Guntersville, AL 35976
Phone:	(757) 710-7622

Facility Name and Address

Name & Address:	Tanner Farm 21570 Fair Oaks Road Melfa, VA 23410
Phone:	(757) 710-7622

Contact Information:

Name:	Jarrod Goodman, Owner
E-mail:	GoodmanJarrod@gmail.com
Phone:	(757) 710-7622

Proposed Beneficial Use:

The proposed use for this withdrawal is for agriculture. Withdrawals will supply a poultry growing operation with water for cooling of chicken houses as well as for direct consumption by poultry.

Processing Dates

Processing Action	Date Occurred/Received
Pre-Application Meeting:	November 2, 2017
Application Received:	December 14, 2017
Permit Fee Deposited by Accounting:	Not Applicable
Notice of Deficiency Sent	February 22, 2018
Response to Notice of Deficiency Received:	April 8, 2018
Request for Additional Information Sent:	April 25, 2018
Response to Request for Additional Information Received:	May 22, 2018
Local Government Ordinance Form Received:	August 10, 2018
Application Complete:	June 18, 2018
Submit Request for Technical Evaluation:	December 18, 2018
Technical Evaluation Received:	February 13, 2019
Draft Permit Package Sent:	April 30, 2019
Submit Draft Permit for Public Notice:	TBD
Public Notice Published:	TBD
End of 30-Day Public Comment Period:	TBD
Response to Public comment:	TBD
Public Meeting or Hearing:	TBD

Application

Application Information

Tanner Farm is a poultry farm owned by Goodman Poultry Farms, LLC and located in Accomack County. Tanner Farm has six poultry houses and six production wells. The houses are all 66 ft wide by 600 ft long in size. The farm produces broilers. Additional information on how water is used at the farm is discussed in the basis of need section of the fact sheet.

The facility was constructed in 2018-2109 and the wells were installed in November 2018. The wells were installed and geophysical data was collected for the Well #1 and Well #6 locations under the guidance of Department staff. Flock production had not started by the end of 2018 and well use had not yet begun.**Location of Facility/Withdrawal:**

Water Supply Planning Unit: Accomack & Northampton

County: Accomack County

GWMA/Aquifer: Eastern Shore/Middle Yorktown-Eastover

Conjunctive Use Source: This system uses no surface water and is therefore not a conjunctive use

system.

Withdrawal Use, Current Need, and Projected Demand:

Basis of Need:
Poultry farms use groundwater to provide drinking water to the birds as well as to supply water to either misting systems or evaporative cooling pads designed to regulate temperatures in the house and keep the birds cool. Cooling is primarily required in summer.

Water use for poultry farms varies seasonally as well as in response to the poultry life cycle. Generally during winter, fall, and spring, facility withdrawals rise and fall in a predictable pattern every 50-60 days, or the length of time it takes to raise a flock, with increased usage primarily resulting from increased water consumption as the birds gain weight. This water use pattern starts with low water consumption volumes for chick development and peaks in the last 20-30 days as growers seek to maximize adult weight gains. Typically, farms raise around five flocks per year with this cycle repeating each time. During the summer, withdrawal volumes increase due to additional water usage for flock cooling purposes.

Water volumes used for consumption are controlled by a computer system that provides water to the drinker system, which provides access to water for the birds but limits spillage or excess moisture from entering the house. Avoiding excess moisture is critical to bird health and as a result careful conservation of water is already a key tenet of management in a broiler house. The computer tracks water supplied to the drinking system and records the volume. This data was maintained by some farms but in many cases was not recorded long-term. Where available, data from the computer is discussed in the historic withdrawals section of the factsheet.

The cooling systems are operated based on temperature and humidity and while usage is typically restricted to summers, operation of the cooling systems tends to vary between farms. Historically, water supplied to the cooling systems was not metered so very limited data is available on usage.

Water Demand Projection: Water demands are based on estimated drinking and cooling water amounts needed to supply all the system houses. Proposed withdrawal limits were calculated based on the total of both consumption (drinking water) and cooling. Water use for consumption was calculated based on water use from a 53 day flock from a similar farm adjusted for the difference in grow area size. An amount of 4,172,701 g/y was determined for consumption with the monthly amount based on the amount needed during the last 31 days of growth when the birds drink the most water.

As no data on volumes used for cooling was available from farms operating on the shore, a procedure for estimating water use for cooling was developed for use based on discussions with industry stakeholders, individual farmers, and a review of available literature. House size and cooling fan capacity were identified as the major variables determining water use for cooling poultry houses. A formula based on 1.6 gallons per year per cubic foot per minute (cfm) of cooling fan capacity was determined to be representative for the Delmarva area poultry industry. The major variable for cooling fan capacity is the width of the house as that provides for the number and size of cooling fans that can be installed. The combined total width of the houses for the facility was used as the basis to estimate cooling water use (3,814,668 g/y). The monthly amount for cooling was simply the annual amount divided by two months to give the

most flexibility for a high cooling need month. The water use calculations are attached to the fact sheet. The permit requires metering of the wells to record total water use and actual amounts used for cooling will be collected.

A small amount of water is used for general farm operation including washing equipment, cleaning houses between flocks, and occasional tree irrigation. As the amount was considered to be negligible, it was not factored into the requested amount.

Water demands are not expected to change as the amount requested represents the maximum capacity of the farm and no additional houses are considered in this permit. Therefore, no projections are included for this facility.

Withdrawal Volumes Requested: The applicant requested the following withdrawal volumes based upon the projected groundwater demand.

Period of Withdrawal	Actual Volume (gal.)	Volume in MGD
Maximum Monthly:	2,452,352	0.082
Maximum Annual:	7,987,639	0.022

DEQ Evaluation

Historic Withdrawals: No record of historic withdrawals was available for this facility as the facility was recently constructed. Refer to the Water demand Projections section above for more information on how water use was estimated.

Analysis of Alternative Water Supplies: The Eastern Shore of Virginia is an area primarily served by groundwater with the majority of withdrawals coming from the three confined Yorktown-Eastover (Upper/Middle/Lower) aquifers. There is limited surface water availability with the majority of streams being too small to supply sufficient water for most purposes, larger water bodies are typically tidally influenced, and water quality concerns have limited the development of these sources. Withdrawals from the surficial aquifer, or water table, are one viable alternative to withdrawals from the confined system. While withdrawals from the surficial aquifer can present additional water quality challenges in the form of iron forming bacteria and increased vulnerability to surface contaminants, it may be viable in some locations where capacity and quality are sufficient. In general, drinking water for poultry must be of higher quality than the cooling water. In most cases, site-specific data will be necessary to determine the viability of the surficial aquifer and to determine what portions of the use it can supply.

Public Water Supply: The proposed withdrawal does not contain a public water supply component.

Water Supply Plan Review: A Water Supply Planner coordination request was sent on September 10, 2018 and a response was received on January 9, 2019. The response noted several key items.

The Accomack County Regional Water Supply Plan (Plan) includes irrigating agricultural facilities using both groundwater and surface water, with current permitted amounts sufficient to

meet demands into 2040. The plan, however, does not include existing poultry farms in their assessments. While the seafood industry could also show future growth in the region, Section 4.0 of the ANPDC Groundwater Management Plan details industrial water for seafood and poultry processing, noting over 90% of industrial groundwater usage is related to poultry processing. WSP Staff note existing water quality concerns for surface waters and no significant water surpluses or sources in Accomack County to serve as alternative sources. Additionally, WSP staff reviewed the current alternatives under consideration, such as water table wells, and noted that the ability of the National Resources Conservation Service's (NRCS) Environmental Quality Incentives Program (EQIP) program to fund such efforts is currently unknown. The current lack of inclusion of poultry in the region's plan, existing water quality and alternative source concerns, and the unknown status of funding for alternative development underlines potential regional resource concerns to be addressed in future planning efforts.

DEQ Recommended Withdrawal Limits: The recommended withdrawal limits are based on the total of both consumption (drinking water) and cooling. Water use for consumption was evaluated based on meter data from a comparable farm. The consumption data from a comparable farm was provided and DEQ staff reviewed the data and determined it provided a reasonable basis for estimating monthly and annual consumption for the facility.

DEQ staff evaluated the volumes requested for cooling and determined they were accurately calculated using the procedure discussed in more detail above. Given the lack of data available for evaluating poultry water use, DEQ believes the methods employed are conservative enough to provide sufficient water for the farm to continue operation while still providing a reasonable limit for the permits. It is expected that as more metered data becomes available, withdrawal limits may be reduced in cases where actual water use is significantly lower than the permit limits.

Withdrawal limits were rounded to nearest hundred thousand in accordance with DEQ's April 6, 2015 "Rounding Memo". DEQ recommends the following withdrawal volumes based upon evaluation of the groundwater withdrawal permit application.

Period of Withdrawal	Actual Volume (gal.)	Volume in MGD
Maximum Monthly:	2,500,000	0.081
Maximum Annual:	8,000,000	0.022

Technical Evaluation:

Aquaveo, LLC performed a technical evaluation of the application for the Department based on the VAHydroGW-ES model. As an aquifer pump test was not performed, the properties from the VAHydroGW-ES model were used to simulate the potential drawdown resulting from the proposed withdrawal. The model uses a base simulation which includes all existing permits (except the applicant wells) operating at their 2017 maximum annual withdrawal limit allowed under the terms of their permit for all Ground Water Management Area (GWMA) permit holders. This base simulation is then executed for 50 years. A second 50-year simulation was then conducted using the VAHydroGW-ES model with the applicant's proposed withdrawals added to the base simulation to simulate drawdown resulting from the applicant's wells using the proposed withdrawal volumes. The objectives of this evaluation were to determine the areas of any aquifers that will experience at least one foot of water level decline due to the proposed withdrawal (the

Area of Impact or AOI), to determine the potential for the proposed withdrawal to cause salt-water intrusion, and to determine if the proposed withdrawal meets the 80% drawdown criteria. A summary of the results of the evaluation are provided below and the full technical evaluation is attached to this fact sheet as Attachment 2.

Aquaveo, LLC reviewed and compared simulated 2017 water levels from the reported use to USGS measured water levels in observation wells closest to the applicant's withdrawal for the same year for the Upper, Middle, and Lower Yorktown-Eastover aquifers. Comparing the VAHydroGW-ES 2017 Historic Use Water Level with the USGS Network Well 2017 Water Level provides a method for judging the accuracy of the VAHydroGW-ES model. They noted that the water levels obtained from the regional observation networks for the Upper, Middle, and Lower Yorktown-Eastover aquifers vary by up to 8 ft feet higher or lower in all three aquifers with the simulated and reported water levels being the closest for the Upper Yorktown-Eastover aquifer. Aquaveo also noted that the observed water levels in all three aquifers exhibit yearly fluctuations in water levels of approximately 2 to 5 ft in the Upper Yorktown-Eastover and 2 to 10 ft. in the Middle and Lower Yorktown-Eastover aquifers. Water levels simulated by the VAHydroGW-ES do not fluctuate in the same manner because the pumping and recharge simulated in the model for any given year are averaged over the year and entered in the model as the average value for the year. Aquaveo concluded that while there are some variations between the observed and simulated water levels, the fluctuations and general patterns observed in the USGS wells are generally simulated by the VAHydroGW-ES model and the water levels from the two sources are in general agreement. Differences between observed and simulated water levels will be noted and addressed during the next calibration of the VAHydroGW-ES model.

The potential for adverse changes to water quality due to increases salinity resulting from the proposed withdrawal was evaluated using transient, density-dependent, SEAWAT simulations using the VAHydroGW-ES. The results indicated that no model cells simulate an increase in chloride concentration greater than 65 mg/L due to the proposed withdrawal. Therefore, the VAHydroGW-ES model results do not indicate the potential for reduced water quality.

The results of the VAHydroGW-ES simulations predict areas of impact due to the proposed withdrawal in the Upper, Middle, and Lower Yorktown-Eastover aquifers. The Area of Impact (AOI), or the area in which the withdrawal is expected to result in a drawdown of at least 1 foot, extend a maximum distance of approximately 0.3, 0.6, and 0.3 miles from the production center in the Upper, Middle, and Lower Yorktown-Eastover aquifers respectively. As the AOI extends off of the property line, a mitigation plan was required to be incorporated into the permit. The modeled area of impact determines the area for which the facility must mitigate any impacts according to the mitigation plan incorporated into this permit.

With the inclusion of the proposed withdrawal, the model simulated baseline water levels at 13.0, 8.8, and 9.5 ft. mls for the Upper, Middle, and Lower Yorktown-Eastover aquifers, respectively. The 80% drawdown criterion allows the potentiometric water level (based on the critical surface elevation calculated from the VAHydroGW-ES data) to be reduced to -69.1, -129.2, and -188.1 feet msl for the Upper, Middle, and Lower Yorktown-Eastover aquifers, respectively. Therefore, the water levels in the VAHydroGW-ES cell containing the applicant wells for each confined aquifer are not simulated to fall below the critical surface. Additionally, no new VAHydroGW-ES cells are simulated to have water levels fall below the critical surface. Therefore, this withdrawal is within the limits set by the 80% drawdown criterion.

Aquaveo, LLC concluded that the proposed withdrawals meet technical criteria for permit issuance. Maps of the AOIs are included in the attached Mitigation Plan.

Part I
Operating Conditions

Authorized Withdrawals:

Owner Well Name	DEQ Well #	Aquifer	Type	Max Pump Setting (ft. bls)*
Well 1	100-01422	Middle Yorktown-Eastover	Production	195
Well 2	100-01423	Middle Yorktown-Eastover	Production	195
Well 3	100-01424	Middle Yorktown-Eastover	Production	195
Well 4	100-01425	Middle Yorktown-Eastover	Production	195
Well 5	100-01426	Middle Yorktown-Eastover	Production	195
Well 6	100-01427	Middle Yorktown-Eastover	Production	195

*Max pump settings for Wells #2, #3, #4, and #5 were interpolated based on the review of geophysical logs from Well #1 and #6.

Apportionment: Apportionment of withdrawals is expected to be fairly equally spread across all facility wells and the permit does not include apportionment limits.

Additional Wells: There are no Observation Wells, Abandoned Wells or Out of Service Wells associated with the newly constructed facility.

Pump Intake Settings: All six well pumps are set at 180 ft bls. All well pumps are correctly positioned in accordance with 9VAC25-610-140(A)(6**).**

Withdrawal Reporting: Groundwater withdrawals are to be recorded monthly and reported quarterly.

Water Conservation and Management Plan:

A Water Conservation and Management Plan (WCMP) meeting the requirements of 9VAC25-610-100.B was submitted and reviewed as part of the application process. The accepted Plan is to be followed by the permittee as an operational Plan for the facility/water system.

- A detailed description of the leak detection and repair program activities and documentation to the Department that these activities have been conducted is due by the end of the first year of the permit term.
- A result of a 12-month audit of the total amount of groundwater used in the distribution system and the amounts for drinking and cooling water, documentation of the flock cycle start and end dates, and any necessary changes to the operation affecting water use is due by the end of the second year of the permit term.
- A report on the plan's effectiveness in maintaining or reducing water use amounts needed, including revisions to those elements of the WCMP that can be improved and addition of other

elements found to be effective based on operations to date shall be submitted by the end of years five [*date*] and ten [*date*] of the permit term.

Mitigation Plan: The predicted AOI resulting from the Technical Evaluation extends beyond the property boundaries in the Upper, Middle, and Lower Yorktown-Eastover aquifers. Given this prediction, a Mitigation Plan to address potential claims from existing well owners within the predicted area of impact is included in the permit by reference.

Well Tags: Well tags will be transmitted with the final permit.

Part II
Special Conditions

Meter Installation/Verification: The applicant states that meters have been installed on each well in-line to measure both the water used for drinking and cooling, as well as maintenance activities. The wells were plumbed together so as to provide a redundant water supply for the houses. The consumption amount is metered for each house electronically. In cases where meters are found to be incorrectly installed or otherwise failing to capture the total water use of each well, DEQ will notify the permittee of such via an inspection report and the permittee shall correct any meter issues within 60 days.

Alternative Source Investigation: The facility is supplied by wells screened in the confined Middle Yorktown-Eastover aquifer. The confined aquifer system on the Eastern Shore is considered to be of higher quality than the surficial (water table) aquifer and is the potable water supply for the majority of the Eastern Shore. The regulation requires the lowest quality water available be applied to the permitted use. While the application states generally that the surficial aquifer would not be viable, site specific investigation is necessary to evaluate the surficial aquifer quality and availability. By September 30, 2022, an alternative source investigation must be completed and the results submitted to DEQ by March 31, 2023 for review and acceptance. The investigation shall provide pump test and water quality data from a test or production well screened in the surficial aquifer on the facility site as well as conclusions on the capability of the surficial aquifer to supply all or part of the water needs for the facility.

Part III
General Conditions

General Conditions are applied to all Groundwater Withdrawal Permits, as stated in the Groundwater Withdrawal Regulations, 9VAC25-610-10 *et seq.*

Public Comment

Relevant Regulatory Agency Comments:

Summary of VDH Comments and Actions: This facility is not a public water supply so soliciting comments from VDH was not required.

Public Involvement during Application Process:

Local and Area wide Planning Requirements: The Accomack County Administrator indicated on August 2, 2018 that the facility's operations are consistent with all ordinances.

Public Comment/Meetings:

The public notice was published in xxxxxx on XXX. The public comment period ran from xxxxx to xxxxx

Changes in Permit Part II Due to Public Comments

Changes in Permit Part III Due to Public Comments

Staff Findings and Recommendations

Based on review of the permit application, staff provides the following findings.

- The proposed activity is consistent with the provisions of the Ground Water Management Act of 1992, and will protect other beneficial uses.
- The proposed permit addresses minimization of the amount of groundwater needed to provide the intended beneficial use.
- The effect of the impact will not cause or contribute to significant impairment of state waters.
- This permit includes a plan to mitigate adverse impacts on existing groundwater users.

Staff recommends Groundwater Withdrawal Permit Number GW0073700 be issued as proposed.

Attachments

1. **Technical Evaluation**
2. **Water Conservation Plan**
3. **Mitigation Plan**
4. **Water Use Calculation Worksheet**
5. **Public Comment Sheet**

Approved: _____
Director, Office of Water Supply

Date: _____

Section 10. Groundwater Conservation and Management Plan

Jarrod Goodman
Tanner Farm
Melfa, Accomack Virginia

March, 2018

Table of Contents

1.0 GENERAL INFORMATION

The Tanner Farm, herein referred to as the "Farm", is an agricultural farm primarily used to grow chickens. This farm is located within the town of Melfa, Accomack County Virginia.

Typical potable water needs at the Farm require consumption of varying amounts of groundwater from its six-well system affected by the time of year, humidity, and the growth stage of the chickens. These wells are located on the Farm property. Because this property is located within the Eastern Shore Groundwater Management Area – as defined by the Virginia Department of Environmental Quality [VDEQ] – a Water Conservation and Management Plan has been prepared in accordance with the Ground Water Management Act of 1992, Chapter 25 (§62.1-254 et seq.) of Title 62.1 of the Code of Virginia. The purpose of this document is to analyze water supply and demand issues facing the Farm and develop a reasoned and justifiable response for water conservation and management. This document is intended to help guide the management of the Farm, who are responsible for the operation and policy management decisions. Lastly, this document will meet the Ground Water Withdrawal Permit requirement for a water conservation and management plan.

Water conservation measures are those physical facilities, equipment, or devices utilized with certain methods, techniques, policies, practices, and procedures, which reduce water consumption, improve water use efficiency, reduce water loss or waste, increase water recycling or reuse and ultimately result in a reduction of water demand. Water management consists of a plan to implement water conservation measures. This Water Conservation and Management Plan, referred to herein as the "Plan" includes identification of water demand and water source and then provide guidance to implement water management and conservation measures.

2.0 WATER DEMAND

Water demand at this Farm is primarily associated with chicken water consumption. Chickens require a precise amount of water. If an improper amount is provided to the chickens, either too much or too little, their health will be significantly affected. The amount of water needed is monitored on a daily basis through the use of computerized measurements, visual inspections of the houses, and knowledge of the animal's water needs at the different growth stages. A smaller amount of groundwater is used to operate evaporative cooling units and for general cleaning and sanitizing.

The Farm has the capacity to operate 6 chicken houses requiring groundwater. Potable water is withdrawn directly from the wells. Potable water at this Farm is administered to the chickens through the use of drip nozzles, a low-flow design. The drip emitters are placed along PVC piping that runs the length of the chicken houses. These lines are automatically pressurized by the wells when pressure switches installed in the facility supply lines dictate.

Evaporative cooling pads cool the houses when needed and are automatically activated based on thermostats installed within the houses. These thermostats are set between approximately 62 and 90 degrees Fahrenheit depending on the stage of growth, size of the birds, ambient temperature and humidity. These cooling pads capture and reuse water and, as such, reduce overall groundwater consumption. Each of the 6 houses will be have 160' of cooling cells installed.

It should be noted that chickens require a definite amount of water but the chickens themselves determine the amount of water they drink. Therefore, there is little that can be done to reduce water consumption for this beneficial use. If the chickens are provided too little water their health will become compromised which can lead to death. Non-viable chickens reduce the pounds of chicken the farm can produce and is therefore avoided by the operation. Too much water, on the other hand, is also undesirable because any water on the ground in the houses can cause the spread of bacteria, viruses, etc., also potentially reducing the pounds of chicken that can be sold. Due to the use of these practices, there are limited additional opportunities to conserve water. The operator is on-site daily as water is used to gauge the proper operation of the water use and delivery systems.

Automated cooling is provided by thermostats and humidistats wired to 160 foot evaporative cooling units in the summer months to keep the houses between as low as 62 degrees Fahrenheit. The chickens are kept at higher temperatures upon their placement into the houses and this temperature is lowered as needed in order to avoid overheating the birds as they grow larger. The automation ensures that only the amount of water required is used for cooling. Water is collected in the evaporative cooling unit sumps and reused as available and only replenished with pumped groundwater as needed.

Water used for cleaning and sanitizing must be measured and used in accordance with cleanser manufacturer's recommended dilution and application rates. Therefore, it is unlikely that more water can be conserved during sanitizing processes.

3.0 WATER SUPPLY

The following section presents a general overview of water resources available to the Farm. The Farm is not tied to any municipal water supply. SIx (6) wells are planned at the Farm that will supply groundwater of an adequate quality and quantity.

This region receives approximately 42 inches of precipitation per year. The Farm does not reclaim stormwater runoff however; this water would not be useful to the operation because the operation requires potable water.

4.0 WATER CONSERVATION MEASURES AND WATER LOSS REDUCTION PROGRAM

The following conservation measures will be implemented with regard to the water supply including groundwater from the Farm's wells.

- Chicken will be provided water using the drip nozzle method to minimize water waste.

- There will be no unnecessary groundwater withdrawals. Water withdrawn under the Farm's Groundwater Withdrawal Permit is withdrawn to supply the chickens with drinking water, regulate chicken house temperatures and to clean and sanitize the chicken houses and equipment when necessary.

- Farm management will review water use monthly and will implement changes when identified:
    - The Owner's consultant maintains an electronic database to record, monitor, and review the required monthly well meter readings.

- Weekly inspections for surface or subsurface leaks will be conducted for all well heads, evaporative cooling units, bladder tanks, meters, main lines, and drip nozzles. Subsurface leaks will be determined where the ground surface is abnormally saturated or where blowouts occur.

- *Water Use Education Program:* Employees will receive instruction as to the importance of efficient water use and conservation methods annually during their orientation.

- *Water Reuse Evaluation*: Chickens require a definite amount of water but the chickens themselves determine the amount of water they drink. Therefore, there is little that can be done to reduce water consumption for this beneficial use. If the chickens are provided too little water their health will become compromised which can lead to death. Non-viable chickens reduce the pounds of chicken the farm can produce and is therefore avoided by the operation. Too much water, on the other hand, is also undesirable because any water on the ground in the houses can cause the spread of bacteria, viruses, etc., also potentially reducing the pounds of chicken that can be sold. Since no excess water is used there is no opportunity to reuse water. Further, water used for cleaning and sanitizing must be measured and used in accordance with manufacturer's recommended dilution and application rates. Therefore, it is unlikely that more water can be conserved during the cleaning and sanitizing process.

- Capture and reuse of water in cooling unit sumps is the main way in which this facility reuses water. These sumps are only replenished with pumped groundwater as needed, and this is typically during time of high temperatures and low humidity.

- Any leak discovered in the water supply system will be repaired as soon as is practical or

will be bypassed so as to minimize loss of water. The operator is on-site daily as water is used to gauge the proper operation of the water use and delivery systems.

- Mandatory water use restrictions will be implemented during water shortage emergencies declared by the local governing body, the Director of DEQ, or the Governor. Non-essential uses of water will be restricted. In addition, Farm personnel will be prohibited from general washing of buildings, paved surfaces, or non-essential equipment. The Farm will comply with penalties for demonstrated failure to comply with mandatory water use restrictions.

- *Water Conservation*: Water conservation efforts shall be followed in order to preserve the resource and right to withdraw water from the resource.

- The facility has a vested financial interest in saving water. This is because water use at this facility requires electricity to run the well pumps, evaporative cooling units, electric valves, etc. Furthermore, water use contributes well pump wear and eventual failure. Because electricity and failing appurtenances cost the facility money, staff is consistently mindful and proactive when it comes to unintentional water use at the facility.

- *Water Loss Reduction Program:* Attached to this plan as Appendix A is the Operational Plan Inspection Report which will be used to fulfill the need for a facility groundwater audit, leak detection and repair program and will act as a scheduling implement for inspections of water using devices and areas. The Operational Plan for the conservation of water at the facility is as follows:

  1) Bi-annually the Operational Plan Inspection Report will be filled out by site personnel and this report will include, but not be limited to, the water used during the months assessed compared to growth stages, etc., leak inspection/detection, leak repair schedules, water use area/device inspections and any high volume water consumption by the facility.

  2) This plan will act as a scheduling tool and report form for the facility to refer to in order to properly document leaks and have them repaired in a timely fashion. Each inspection report should comment on the previous report's findings and set dates, deadlines and schedules for repairing leaks.

  3) A groundwater audit will be conducted annually during the first two years of the permit cycle. Primarily, this will consist of the comparison of the total groundwater withdrawn month to month and year to year when compared with the flock grown, and in comparison to previous years and expectations based on population, etc.

  4) Photographs can be included in the report in order to track the progression of a device which may be failing or a repair in progress.

APPENDIX A – WATER LOSS REDUCTION PROGRAM OPERATIONAL PLAN AND SCHEDULE

Groundwater Withdrawal Operational Plan Inspection Report

Date: 2/28/2018

Facility: Tanner Farm
Permit # GW0073700
Inspection Date:
Inspection Time:
Inspector:

Groundwater Audit Summary

YTD Water Usage:
YTD Last Year:

Audit Notes: Is the above water use consistent with previous year's usage and/or current operations on site?

Leak Detection and Repair

	Satisfactory	*Not Satisfactory*	*Repair Required? Repair date/schedule*
Wells	X		Are these wells and their associated lines in good shape?
Bladder Tanks	X		Is this tank in good shape to prevent leaks?
Feed lines	X		Are any of the feed lines leaking?
Buried Lines	X		Is there any sign of pooling water (not from precipitation) on the grounds at the facility?

Water Using Devices and Areas

	Satisfactory	*Not Satisfactory*	*Devices inspected? Operating Properly? If not, schedule for repairs*

Water Reuse Evaluation

Were any opportunities for water reuse found? If so, detail the change in operation which allows for water to be reused.

Inspection summary and Additional Comments

-

Photographs of areas of concern

MITIGATION PLAN

DEQ GROUNDWATER WITHDRAWAL PERMIT NO. GW00073700

OWNER NAME: Jarrod Goodman

FACILITY NAME: Tanner Farm

LOCATION: Melfa, Virginia

INTRODUCTION

On 12/15/17, Jarrod Goodman submitted a Groundwater Withdrawal Permit Application to the Virginia Department of Environmental Quality (DEQ) to withdraw groundwater. Groundwater withdrawals associated with this permit will be utilized to provide water to a poultry growing operation.

The purpose of this Mitigation Plan is to provide existing groundwater users a method to resolve claims that may arise due to the impact of the withdrawal from the Tanner Farm well field. Predicted drawdown of water levels due to the withdrawal(s) from the Middle Yorktown Eastover and Columbia aquifers are shown in the attached maps(s) provided by the DEQ.

Modeled impacts, as shown on the attached maps, extend beyond the boundary of the Tanner Farm facility. Due to these findings, Jarrod Goodman recognizes that there will be a rebuttable presumption that water level declines that cause adverse impacts to existing groundwater users within the area of impact are due to this withdrawal. Claims may be made by groundwater users outside this area; however, there is a rebuttable presumption that Jarrod Goodman has not caused the adverse impact. Jarrod Goodman proposes this plan to mitigate impacts to existing users and excludes impacts to wells constructed after the effective date of this permit.

CLAIMANT REQUIREMENTS

To initiate a claim, the claimant must provide written notification of the claim to the following address:

Contact Name	Jarrod Goodman
Title	Owner
Permittee Name	Jarrod Goodman
Address	124 Lake Creek Dr.
City, State Zip Code	Guntersville, AL, 35976

The claim must include the following information: (a) a deed or other available evidence that the claimant is the owner of the well and the well was constructed and operated prior to the effective date of the permit; (b) all available information related to well construction, water levels, historic yield, water quality, and the exact location of the well sufficient to allow Jarrod Goodman to locate the well on the claimant's property; (c) the reasons the claimant believes that the Knox Landing and Tanner Farm withdrawal has caused an adverse impact on the claimants well(s).

CLAIM RESOLUTION

Jarrod Goodman will review any claim within **five (5) business days**. If Jarrod Goodman determines that no rebuttal will be made and accepts the claim as valid, Jarrod Goodman will so notify the claimant and will implement mitigation within **thirty (30) business days**. If the claim is not accepted as valid, Jarrod Goodman will notify the claimant that (a) the claim is denied **or** (b) that additional documentation from the claimant is required in order to evaluate the claim. Within **fifteen (15) business days** of receiving additional documentation from the claimant, Jarrod Goodman will notify the claimant (a) that Jarrod Goodman agrees to mitigate adverse impacts or (b) the claim is denied. If the claim is denied, the claimant will be notified that the claimant may request the claim be evaluated by a three (3) member committee. This committee will consist of one (1) representative selected by Jarrod Goodman, one (1) representative selected by the claimant, and one (1) representative mutually agreed upon by the claimant and Jarrod Goodman.

Any claimant requesting that a claim be evaluated by the committee should provide the name and address of their representative to Jarrod Goodman. Within **five (5) business days** of receipt of such notification, Jarrod Goodman will notify the claimant and claimant's representative of the identity of Jarrod Goodman representative and instruct the representatives to select a third representative within **ten (10) business days**. Representatives should be a professional engineer or hydrogeologist with experience in the field of groundwater hydrology. Jarrod Goodman agrees to reimburse the members of the committee for reasonable time spent, at a rate prevailing in the area for experts in the above listed fields, and for direct costs incurred in administering the plan. The claimant may, at his or her option, choose to provide the reimbursement for the member of the committee selected by the claimant and up to half of the reimbursement for the mutual representative.

Within **ten (10) business days** of selection of the third representative, the committee will establish a **reasonable deadline** for submission of all documentation it needs to evaluate the claim. Both the claimant and Jarrod Goodman will abide by this deadline.

Within **fifteen (15) business days** of receipt of documentation, the committee will evaluate the claim and reach a decision by majority vote. The committee will notify the claimant regarding its decision to (a) deny or (b) approve the claim. If the claim is approved, Jarrod Goodman will mitigate the adverse impacts within **thirty (30) business days** of making the

decision or as soon as practical. If the claim is denied by the committee, Jarrod Goodman may seek reimbursement from the claimant for the claimant's committee representative and one half of the 3rd representative on the committee.

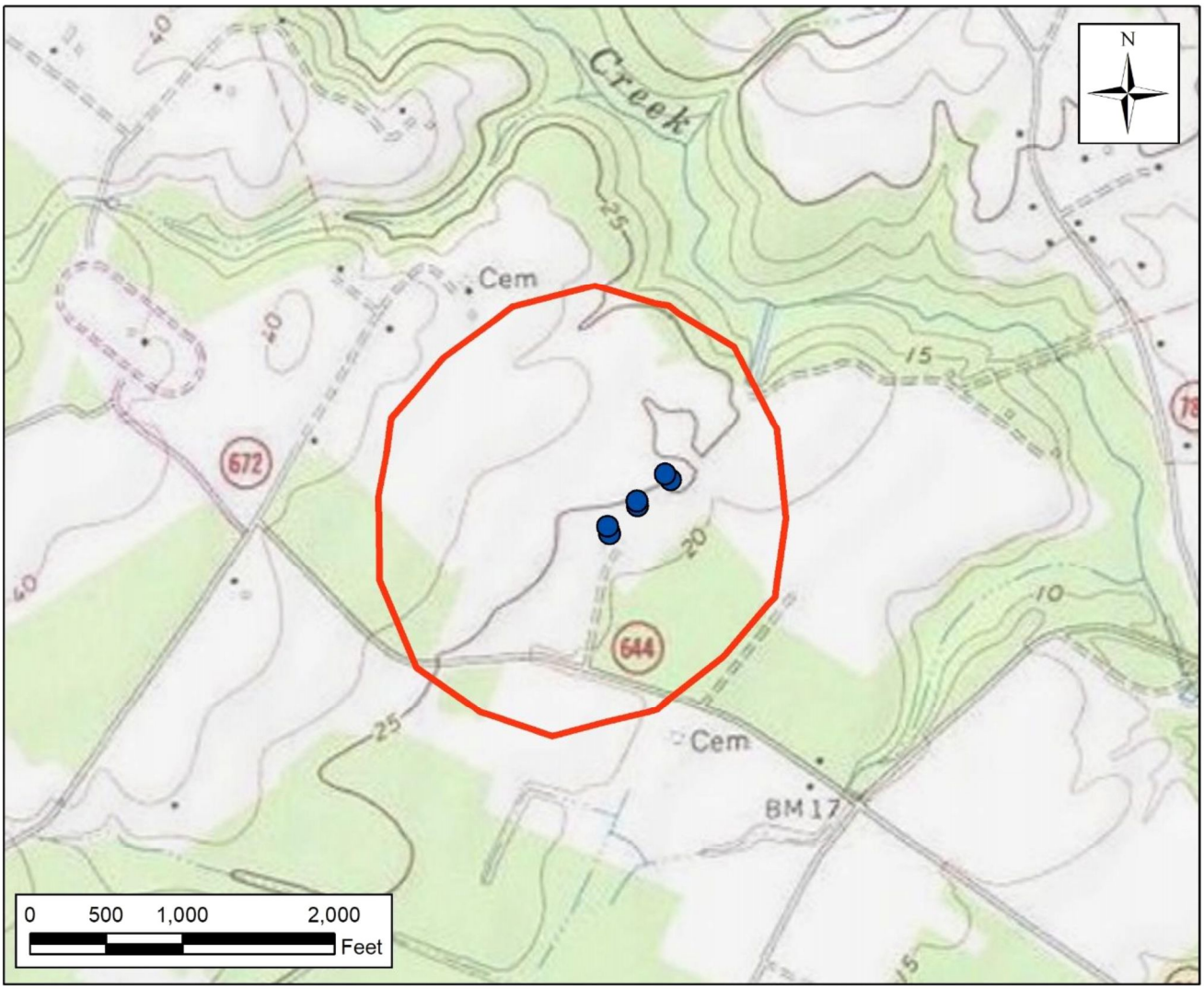
If a claimant within the indicated area of impact indicates that they are out of water, Jarrod Goodman will accept the responsibility of providing water for human consumptive needs within **seventy-two (72) hours** and to cover the claim review period. Jarrod Goodman reserves the right to recover the cost of such emergency supply if the claim is denied by Jarrod Goodman or found to be fraudulent or frivolous. If Jarrod Goodman denies a claim and the claimant elects to proceed with the three (3) member committee, Jarrod Goodman will continue the emergency water supply at the claimants request during the committee's deliberations, but reserves the right to recover the total costs of emergency water supply in the case that the committee upholds the denial of the claim. Similarly, Jarrod Goodman reserves the right to recover costs associated with the claim process if a claim is found to be fraudulent or frivolous.

If it is determined by the committee or shown to the committee's satisfaction that a well operating under a mitigation plan similar to Jarrod Goodman's Plan other than those owned and operated by Jarrod Goodman has contributed to the claimed adverse impact, Jarrod Goodman's share of the costs associated with mitigation will be allocated in proportion to its share of the impact. Such a determination shall be made by the committee after notification of the third party well owner, giving the third party well owner opportunity to participate in the proceedings of the committee.

PLAN ADMINISTRATION

Nothing in the Plan shall be construed to prevent the Department of Environmental Quality Staff from providing information needed for resolution of claims by the committee.

Tanner Farm
Area of Impact - Upper Yorktown-Eastover Aquifer



Tanner Farm Wells

Upper Yorktown-Eastover Aquifer Area of Impact

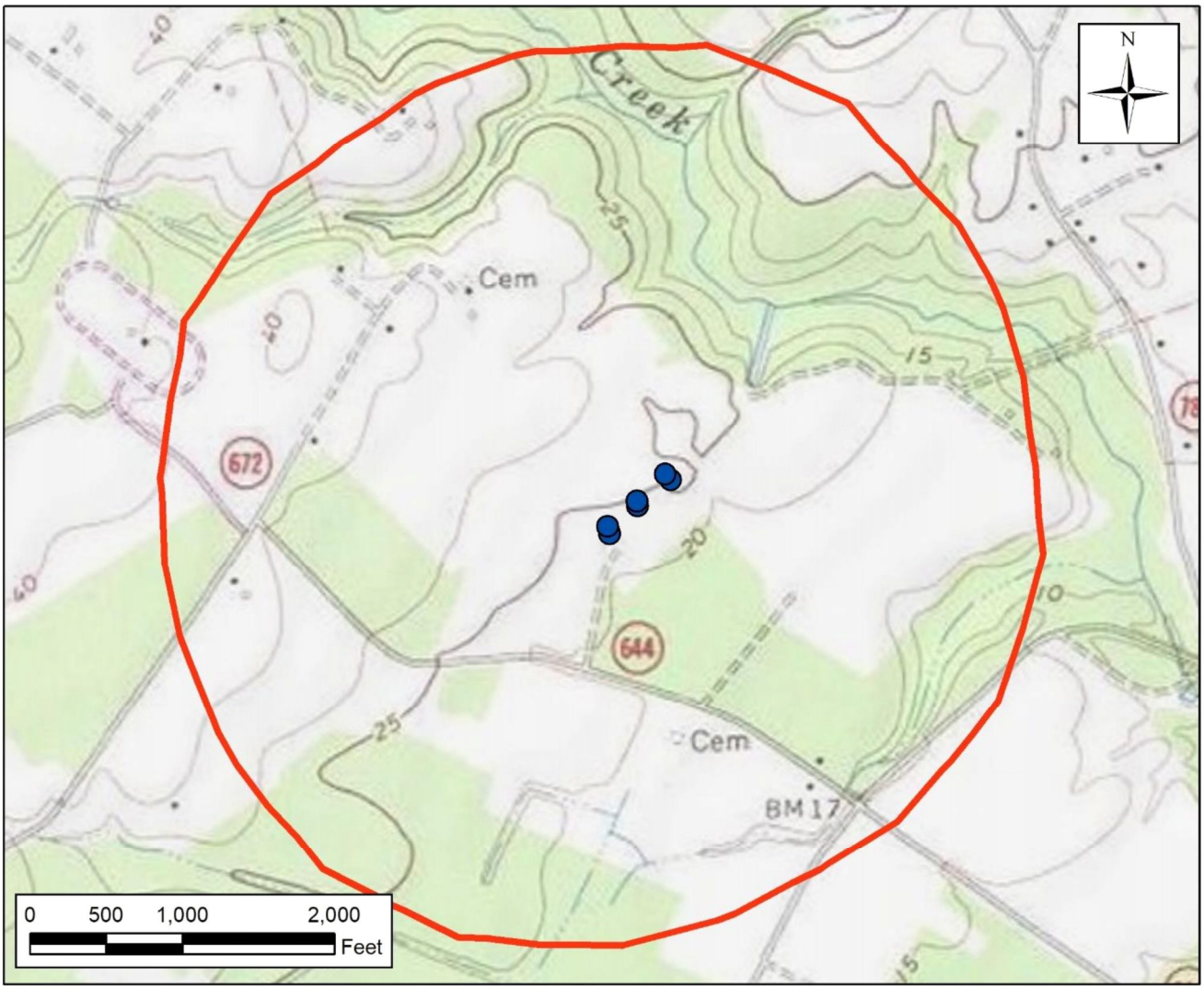
Simulated drawdown at or exceeding one foot in the Upper Yorktown-Eastover aquifer resulting from a 8,000,000 gallons per year (21,918 average gpd), 50 year withdrawal from the Middle Yorktown-Eastover aquifer using the VAHydroGW-ES.

Maximum radius of one foot drawdown (Area of Impact) extends approximately 0.3 miles from the pumping center.

Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply
December 14, 2018

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Tanner Farm
Area of Impact - Middle Yorktown-Eastover Aquifer



Tanner Farm Wells

Middle Yorktown-Eastover Aquifer Area of Impact

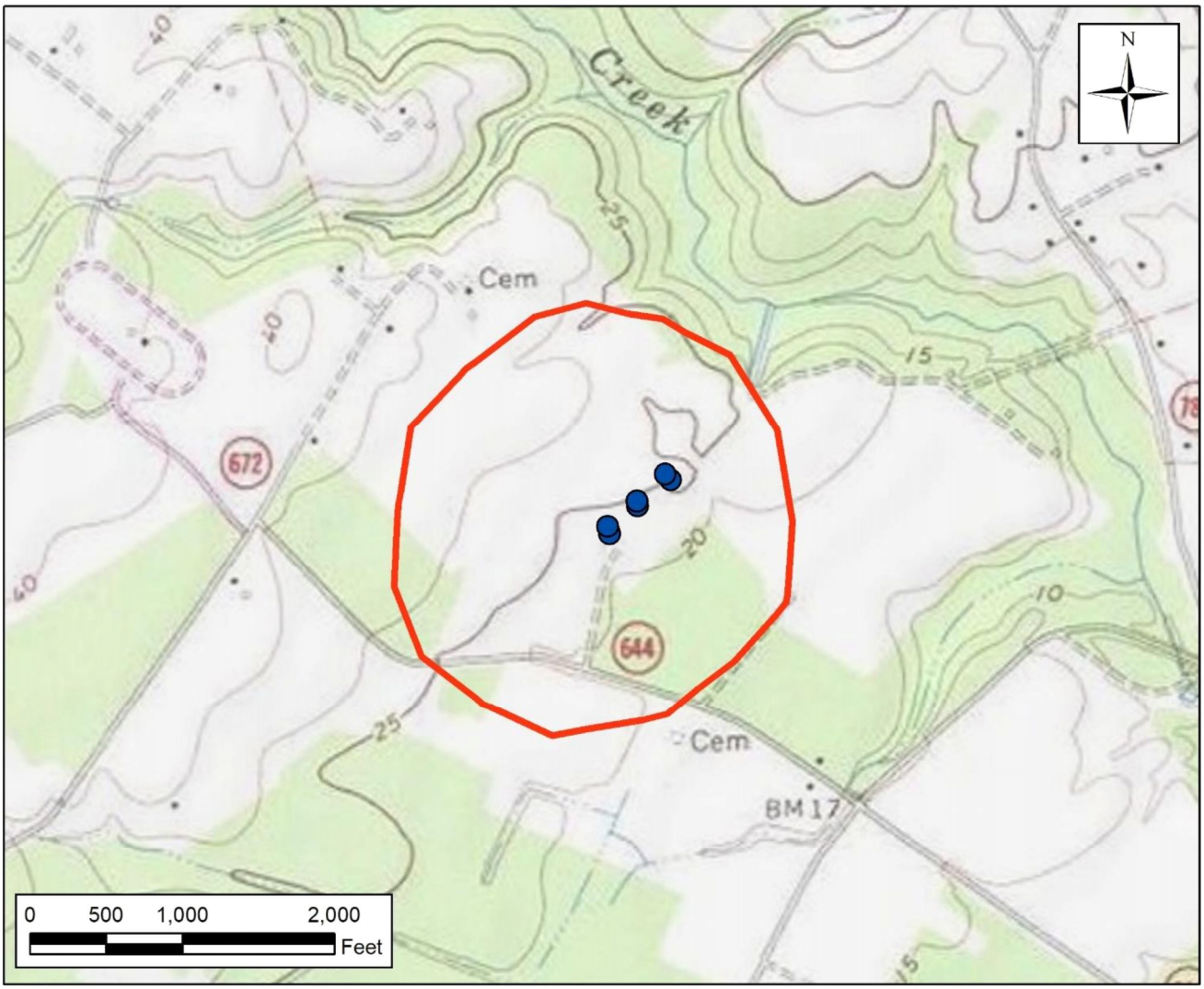
Simulated drawdown at or exceeding one foot in the Middle Yorktown-Eastover aquifer resulting from a 8,000,000 gallons per year (21,918 average gpd), 50 year withdrawal from the Middle Yorktown-Eastover aquifer using the VAHydroGW-ES.

Maximum radius of one foot drawdown (Area of Impact) extends approximately 0.6 miles from the pumping center.

Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply
December 14, 2018

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Tanner Farm
Area of Impact - Lower Yorktown-Eastover Aquifer



Tanner Farm Wells

Lower Yorktown-Eastover Aquifer Area of Impact

Simulated drawdown at or exceeding one foot in the Lower Yorktown-Eastover aquifer resulting from a 8,000,000 gallons per year (21,918 average gpd), 50 year withdrawal from the Middle Yorktown-Eastover aquifer using the VAHydroGW-ES.

Maximum radius of one foot drawdown (Area of Impact) extends approximately 0.3 miles from the pumping center.

Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply
December 14, 2018

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

sold. The operator is on-site daily as water is used to gauge the proper operation of the water use and delivery systems.

Documentation of Beneficial Use

The beneficial use of water on-site is the growth of hundreds of thousands of chickens for human consumption per year. The water use data that is currently available is taken from the electronic monitoring of each chicken house's water consumption, for chicken imbibing alone, for a single flock filling six houses. This data has been provided in Table 1.

Water Demand Projections

The data in Tables 1, 2, 2A, 3, and 4 are utilized in order to determine the monthly and annual groundwater requirements for the Farm. The owners intends to utilize all of the available 6 houses to grow chickens. Permitted amounts for the 6 houses were extrapolated from data gathered from electronic monitoring of the owner's nearly identical "Knox Landing" chicken houses.

The total annual withdrawal requirement is calculated through several steps. Table 1 sums the water use from an actual flock that required 53 days to grow for a total of 669,218 gallons. Table 2 multiplies the gallons/flock/house summed in table 1 with the flocks/year and the typical mortality rate. This product is summed with the estimated gallons required annually for evaporative cooling and this sum is divided by the square footage of each house for the Gallons/ Square Foot of House/ Year figure. Finally, the greatest of these figures (33.62 Gal/ft^2/yr for House #6) is then multiplied by the total projected grow area in Table 3 (237,600 ft^2) for an annual maximum withdrawal requirement of 7,987,639 gallons.

Total Annual Withdrawal =

$$\left(\left(\left(\frac{\frac{Gallons}{Flock}}{House} * \frac{Flocks}{year} * \boldsymbol{Mortality\ Rate}\right) + \boldsymbol{Evap.}\right)/\boldsymbol{House\ Area}\right) * \boldsymbol{Total\ Ft^2\ of\ Facility\ Houses}$$

The mortality rate is included in the above calculation because despite the fact that typically 2% of the birds die within a given flock, it is possible that all of them survive and will require water. The annual cooling water requirement/ house is calculated through a methodology provided by DEQ (shown in Table 2A) and is detailed on the attachments provided at the end of Section 8. The tunnel fan capacity (in ft^3/minute or CFM) for all houses is multiplied by 1.69 gallons/CMF to determine an annual withdrawal estimate of 3,814,668 gallons/year.

The total monthly withdrawal requirement is calculated through several steps and is shown in Table 4. Since a flock takes approximately 50 days to mature and water consumption increases as the flock grows, the maximum rate of water use during a month will occur when the birds spend their last 31 days at the facility and those 31 days occur within the same month. Therefore, the summation of days 22-53 total water use in Table 1 (534,332 gallons) is multiplied by the mortality rate (1.02) and this figure summed with the evaporative cooling water requirement (1,907,334 gallons) for a monthly maximum withdrawal requirement of 2,452,352 gallons. The total annual evaporative cooling water use value of 3,814,668 gallons per house

calculated in the paragraph above is divided by two in the maximum monthly withdrawal calculation to allow for operational flexibility in a given month.

A small amount of water will be used to sanitize the floors within the houses. This usage is be negligible when compared to the total withdrawal amount and, as such, is not significant enough to merit inclusion with the above calculations.

Apportionment of Withdrawal

Limited amounts of apportionment data exist because the system is relatively new and meters have yet to be installed on each of the 6 wells. It will be assumed that because each of the 6 houses are the same square footage and each house is essentially served by its own well that the wells will share the apportionment equally at a rate of 16.66% each or 1.33 million gallons per year. Well apportionment percentages will change on a seasonal and intermittent basis.

Table 1 - Flock Water Consumption (gallons)

Day	House #1 Water Use (Gal)*	House #2 Water Use (Gal)	House #3 Water Use (Gal)	House #4 Water Use (Gal)	House #5 Water Use (Gal)	House #6 Water Use (Gal)	Total
1	165	161	98	52	90	87	**653**
2	235	230	222	163	215	224	**1,289**
3	377	369	369	302	350	367	**2,134**
4	501	490	454	409	453	471	**2,778**
5	567	555	530	493	508	532	**3,185**
6	644	630	620	593	594	615	**3,696**
7	731	715	703	672	686	710	**4,217**
8	814	796	792	768	753	814	**4,737**
9	953	932	913	875	886	927	**5,486**
10	1056	1033	1030	958	1005	1031	**6,113**
11	1174	1148	1142	1052	1083	1110	**6,709**
12	1260	1232	1186	1100	1153	1205	**7,136**
13	1291	1263	1256	1164	1305	1313	**7,592**
14	1364	1334	1357	1291	1413	1398	**8,157**
15	1515	1482	1514	1471	1540	1480	**9,002**
16	1599	1564	1582	1555	1568	1547	**9,415**
17	1547	1513	1579	1563	1584	1543	**9,329**
18	1646	1610	1644	1638	1750	1768	**10,056**
19	1803	1763	1735	1709	1838	1837	**10,685**
20	1879	1838	1809	1842	1933	1893	**11,194**
21	1940	1897	1949	1833	1868	1835	**11,322**
22	1998	1954	2012	1918	1961	1910	**11,753**
23	2144	2097	2065	2025	2070	1967	**12,368**
24	2278	2228	2230	2044	2116	2008	**12,904**
25	2239	2190	2155	2045	2345	2294	**13,268**
26	1923	1881	2001	2003	2333	2253	**12,394**
27	1304	1275	1110	998	2601	2535	**9,823**
28	2452	2398	2111	1943	2800	2655	**14,359**
29	3056	2989	3242	2940	1939	1725	**15,891**
30	1324	1295	1358	1187	1471	1381	**8,016**
31	1414	1383	1315	1142	3047	2939	**11,240**
32	2951	2886	3033	2725	3534	3423	**18,552**
33	3558	3480	3604	3335	2816	2750	**19,543**
34	3395	3320	2588	3323	3593	3759	**19,978**
35	3363	3289	3859	3833	2313	2006	**18,663**
36	2127	2080	2869	2373	3753	3752	**16,954**
37	3644	3564	3962	3869	3463	3476	**21,978**
38	3591	3512	3537	3598	3286	3584	**21,108**
39	3636	3556	3308	3460	3179	3578	**20,717**
40	3371	3297	3228	3404	3263	3572	**20,135**
41	3305	3232	3278	3056	3224	3574	**19,669**
42	3133	3064	3197	3582	3354	3582	**19,912**
43	3164	3094	3262	3347	3232	3486	**19,585**
44	3240	3169	3195	3459	3172	3411	**19,646**
45	3231	3160	3273	3380	3174	3400	**19,618**
46	3379	3305	3580	3431	3299	3477	**20,471**
47	3325	3252	3469	3434	3117	3563	**20,160**
48	3310	3237	3589	3488	3151	3650	**20,425**
49	3461	3385	3461	3432	3243	3454	**20,436**
50	3592	3513	3276	3408	3210	3509	**20,508**
51	3701	3620	3469	3237	3306	3494	**20,827**
52	2987	2921	2951	2851	639	769	**13,118**
53	71	69	113	60	0	0	**313**
Total	**112,729**	**110,250**	**112,184**	**109,833**	**110,579**	**113,643**	**669,218**

* House #1 daily use data was extrapolated from House #1 total flock use and proportions of daily use to total use for House #2.

Table 2 - Annual House Water Use

	Gallons/Flock	Annual Gallons for Evap. Cooling	Flocks/Year	House Area (ft^2)	Mortality Rate	Gal/ ft^2 of House/ Year
House #1	112,729	635,778	6	39,600	1.02	33.48
House #2	110,250	635,778	6	39,600	1.02	33.09
House #3	112,184	635,778	6	39,600	1.02	33.39
House #4	109,833	635,778	6	39,600	1.02	33.03
House #5	110,579	635,778	6	39,600	1.02	33.14
House #6	113,643	635,778	6	39,600	1.02	33.62

Table 2A: Annual Cooling Pad Water Use

	Air Speed (FPM)	House Width (ft)	House Height (ft)	Tunnel Fan Capcity (CFM) = FPM x W x H	Annual Cooling Water Use (Gal) = CFM x 1.6 Gal/Yr/CFM
House #1	600	66	9.5	376,200	635,778
House #2	600	66	9.5	376,200	635,778
House #3	600	66	9.5	376,200	635,778
House #4	600	66	9.5	376,200	635,778
House #5	600	66	9.5	376,200	635,778
House #6	600	66	9.5	376,200	635,778
Total	3,600	396	57	2,257,200	**3,814,668**

Table 3 - Total Annual Withdrawal Requirement

House Area (ft^2)	Total Max Withdrawal ($Gal/ft^2/Year$)	Annual Maximum Amount Required (Gal)
237,600	33.62	7,987,639

Table 4 - Total Monthly Withdrawal Requirement

Last 31 Days of Flock Consumpton (Gal)	Mortality Rate	Evap. Cooling Water (Gal)	Monthly Maximum Amount Required (Gal)
534,332	1.02	1,907,334	2,452,352

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

TECHNICAL EVALUATION FOR PROPOSED GROUNDWATER WITHDRAWAL

Date: December 14, 2018

Application /Permit Number: GW0073700

Owner / Applicant Name: Goodman Poultry Farms, LLC

Facility / System Name: Tanner Farm

Facility Type: Agriculture – Poultry Farm

Facility / System Location: Accomack County

The Commonwealth of Virginia's Groundwater Withdrawal Regulations (9VAC25-610-110(D) state that, for a permit to be issued for a new withdrawal, to expand an existing withdrawal, or reapply for a current withdrawal, a technical evaluation shall be conducted. This report documents the results of the technical evaluation conducted to meet the requirements for the issuance of a permit to withdrawal groundwater within a Groundwater Management Area as defined in (9VAC25-600-10 et seq.).

This evaluation determines the:

(1) The Area of Impact (AOI): The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal.
(2) Water Quality: The potential for the proposed withdrawal to cause salt water intrusion into any portions of any aquifers or the movement of waters of lower quality to areas where such movement would result in adverse impacts on existing groundwater users or the groundwater resource as per (9VAC25-610-110(D)(2), and
(3) The Eighty Percent Drawdown (80% Drawdown): The proposed withdrawal in combination with all existing lawful withdrawals will not lower water levels, in any confined aquifer that the withdrawal impacts, below a point that represents 80% of the distance between the land surface and the top of the aquifer at the points where the one-foot drawdown contour is predicted for the proposed withdrawal as per 9VAC25-610-110(D)(3)(h).

Summary of Requested Withdrawal:

General:

In response to the Department of Environmental Quality's (DEQ) Compliance Assistance Framework initiative, a cohort of poultry farms in Accomack County were identified as potentially requiring a groundwater withdrawal permit (GWWP). The farms primarily grow broilers which are processed by several poultry integrators located in the area. These farms use groundwater to provide drinking water to the birds as well as to supply water to either misting systems or evaporative cooling pads which cool the birds. Cooling is primarily required in summer. Most wells associated with poultry farms in Accomack County are screened in either the upper, middle, or lower Yorktown-Eastover aquifers. The use of the Columbia (water-table) aquifer is being investigated by the industry and this aquifer may be used in the future to augment withdrawals from confined aquifers where possible.

Water use for poultry farms varies seasonally as well as in response to the poultry life cycle. Generally during winter, fall, and spring, facility withdrawals rise and fall in a fairly predictable pattern every 50-60 days, with usage primarily resulting from water consumption. This pattern starts with low water

consumption volumes for chick development and maxes out in the last 20-30 days as breeders seek to maximize adult weight gains. Typically, farms raise around five flocks per year with this cycle repeating each time. During the summer, withdrawal volumes increase due to additional water usage for flock cooling purposes. A few farms have additional sanitary and other agricultural uses (crops/other livestock).

Facility Specific:
Tanner Farm has six poultry houses and six production wells. The houses are all 66 x 600 ft. Proposed withdrawal limits were calculated based on the total of both consumption (drinking water) and cooling. Water use for consumption was calculated based on data from a comparable farm. Water use for cooling was calculated based on estimates based on house size and cooling fan capacity.

Volumes include additional usage for onsite sanitation of the houses between flocks but this use was considered to be minimal.

The proposed withdrawal limits, well apportionment, and well construction details are as follows:

Proposed Withdrawal Limits:

Proposed Withdrawal Limits	
Annual Value	8,000,000 (21,918 average gpd)
Monthly Value	2,500,000 (80,645 average gpd)

Due to the well and plumbing configuration, the withdrawal will be apportioned fairly equally between the system wells.

Production Well(s):

Identification	**Location**	**Construction-GW-2 Forms pending**	**Pump Intake**	**Source Aquifer**
Owner Well Name: Well #1 DEQ Well Number: 100-01422 MPID: 373912075420401	Lat: 37° 39' 12.827" Lon: 75° 42' 4.09" Datum: WGS84 Elevation: 23.1	Completion Date: Fall 2018 Screens (ft-bls): 223-238 Total Depth (ft-bls): 238	Not Determined	Middle Yorktown-Eastover
Owner Well Name: Well #2 DEQ Well Number: 100-01423 MPID: 373913075420402	Lat: 37° 39' 13.283" Lon: 75° 42' 4.259" Datum: WGS84 Elevation: 23.3	Completion Date: Fall 2018 Screens (ft-bls): 223-238 Total Depth (ft-bls): 238	Not Determined	Middle Yorktown-Eastover

Owner Well Name: Well #3 DEQ Well Number: 100-01424 MPID: 373914075420103	Lat: 37° 39' 14.572" Lon: 75° 42' 1.774" Datum: WGS84 Elevation: 23	Completion Date: Fall 2018 Screens (ft-bls): 205-220 Total Depth (ft-bls): 220	Not Determined	Middle Yorktown-Eastover
Owner Well Name: Well #4 DEQ Well Number: 100-01425 MPID: 373914075420104	Lat: 37° 39' 14.905" Lon: 75° 42' 1.810" Datum: WGS84 Elevation: 23.2	Completion Date: Fall 2018 Screens (ft-bls): 205-220 Total Depth (ft-bls): 220	Not Determined	Middle Yorktown-Eastover
Owner Well Name: Well #5 DEQ Well Number: 100-01426 MPID: 373916075415905	Lat: 37° 39' 16.23" Lon: 75° 41' 59.370" Datum: WGS84 Elevation: 23.4	Completion Date: Fall 2018 Screens (ft-bls): 210-225 Total Depth (ft-bls): 225	Not Determined	Middle Yorktown-Eastover
Owner Well Name: Well #6 DEQ Well Number: 100-01427 MPID: 373916075415906	Lat: 37° 39' 16.612" Lon: 75° 41' 59.470" Datum: WGS84 Elevation: 23.4	Completion Date: Fall 2018 Screens (ft-bls): 210-225 Total Depth (ft-bls): 225	Not Determined	Middle Yorktown-Eastover

Geologic Setting:

The Tanner Farm wells (applicant wells) are located in southern Accomack County. The production wells are screened in the Middle Yorktown-Eastover aquifer. The upper portion of the Yorktown-Eastover aquifer (described in the 2006 Virginia Coastal Plain Hydrologic Framework[1] (VCPHF) as a combination of the Upper, Middle, and Lower Yorktown-Eastover aquifers) is composed primarily of estuarine to marine quartz sands of the Yorktown Formation of Pliocene age. The nearest USGS geologic cross section found in USGS Professional Paper 1731 is cross-section GS-GS' (see attached figure at the end of the report).

[1] McFarland, E.R., and Bruce, T.S., 2006, The Virginia Coastal Plain Hydrogeologic Framework: U.S. Geological Survey Professional Paper 1731, 118 p., 25 pls.

Virginia Eastern Shore Model data:
The following table lists the location of the applicant production wells within the Virginia Eastern Shore Model[2] (VAHydroGW-ES).

VAHydroGW-ES Model Grid				
Well	**Well Number**	**MPID**	**Row**	**Column**
Well #1	100-01422	373912075420401	156	53
Well #2	100-01423	373913075420402	156	53
Well #3	100-01424	373914075420103	155	53
Well #4	100-01425	373914075420104	155	53
Well #5	100-01426	373916075415905	155	53
Well #6	100-01427	373916075415906	155	53

Hydrologic Framework:
Data from the VCPHF is reported in this technical report to illustrate the hydrogeologic characteristics of the aquifers in the Virginia Eastern Shore near the applicant wells and identify major discrepancies between regional hydrogeology and site logs interpreted by the DEQ staff geologist.

The following average aquifer elevations were estimated from the VAHydroGW-ES at the model cell(s) containing the applicant production wells.

VAHydroGW-ES Average Hydrologic Unit Information		
Aquifer	**Elevation (feet msl)**	**Depth (feet bls)**
Surface	25	0
Columbia aquifer (bottom)	-24	50
Upper Yorktown-Eastover aquifer (top)	-91	117
Upper Yorktown-Eastover aquifer (bottom)	-139	164
Middle Yorktown-Eastover aquifer (top)	-166	191
Middle Yorktown-Eastover aquifer (bottom)	-212	237
Lower Yorktown-Eastover aquifer (top)	-239	264
Lower Yorktown-Eastover aquifer (bottom)	-314	339

Groundwater Characterization Program Recommendations:
DEQ staff geologist has reviewed available information and made the following determinations regarding the location of the aquifer tops for the following wells. Information reviewed in this process included geophysical logs from Wells #1 and #6, the driller's logs, and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

[2] Sanford, W.E., Pope, J.P., and Nelms, D.L., 2009, Simulation of groundwater-level and salinity changes in the Eastern Shore, Virginia: U.S. Geological Survey Scientific Investigations Report 2009–5066, 125 p.

Unit	Well #1 (ft-bls)	Well #6 (ft-bls)
Bottom of the Columbia	35	35
Top of the Upper Yorktown-Eastover	120	120
Bottom of the Upper Yorktown-Eastover	160	158
Top of the Middle Yorktown-Eastover	195	195
Bottom of the Middle Yorktown-Eastover	235	235
Top of the Lower Yorktown-Eastover	Not Encountered	Not Encountered

Comparison of the Hydrogeologic Framework and Groundwater Characterization Program Recommendations:
The average Middle Yorktown-Eastover aquifer top and bottom elevations of -172 ft-msl/195 ft-bls and -212 ft-msl/235 ft-bls provided by the DEQ staff geologist are lower than and equal to, respectively, the elevations reported in the VAHydroGW-ES framework (-166 and -212 ft-msl). Thus, the unit thickness in the VAHydroGW-ES for the Middle Yorktown-Eastover aquifer is slightly larger, by 6 feet, than the unit thickness supplied by DEQ staff. Local variation not captured on the regional scale of the VAHydroGW-ES are expected to occur. Observed discrepancies are noted and the VAHydroGW-ES is updated on a regular basis to reflect the most up-to-date surface elevations that are available.

Water Level Comparison:
Below water levels retrieved from the USGS regional observation network wells are compared to the simulated water levels reported in the *Virginia Eastern Shore 2017-2018 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report (the 2017-2018 report) and simulation files.[3] This comparison is made in order to evaluate the performance of the regional model in the vicinity of the applicant wells and assess historical groundwater trends.

The 2017-2018 report provides two sets of simulated potentiometric water surface elevations. The VAHydroGW-ES model is divided into three parts. The first portion of the model simulates water levels within the Eastern Shore aquifers from 1900 through 2017 based upon historically reported pumping amounts (the "*Historic Use Simulation*"). This portion of the model has been calibrated to match water levels observed in USGS regional observation network wells situated throughout the peninsula. The water levels reported in the 2017-2018 report are based upon two separate simulations, each simulation running from 2018 through 2067. The simulated pumping amount in these two simulations are based upon, 1) the average 2013-2017 reported withdrawal amount of wells in the VAHydroGW-ES model (the "R*eported Use Simulation*") and, 2) the current (2018) maximum withdrawal amount allowed under their current permit for wells in the VAHydroGW-ES model (the "*Total Permitted Simulation*"). Both these simulations are an extension of the *Historic Use Simulation* and the water levels reported in the 2017-2018 report are the final water levels simulated at the end of the simulations (2067).

The "VAHydroGW-ES 2067 Reported Use Water Level," reported in the tables below, is the simulated water level – 50 years from present – if all permitted pumping continued at the average 2013-2017 reported withdrawal amount for the next 50 years. And the "VAHydroGW-ES 2067 Total Permitted Water Level," reported in the tables below, is the simulated water level – 50 years from present – if all Eastern Shore permitted wells were to pump at the maximum permitted amount allowed under their current permit for the next 50 years. Finally, the "VAHydroGW-ES 2017 Historic Use Water Level," reported in the tables below, is the water level simulated for the year 2017 in the *Historic Use Simulation*.

[3] See *Virginia Eastern Shore 2017-2018 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report and simulation files on file with the VA DEQ.

The nearest USGS regional observation network wells to the applicant wells, completed in the Upper, Middle, or Lower Yorktown-Eastover aquifers, are listed in the following tables and shown in Figure 1. For the USGS regional observation network wells, average 2017 reported water levels are shown in the following tables. Simulated water levels for the Upper, Middle, and Lower Yorktown-Eastover aquifers, for the VAHydroGW-ES cells containing the USGS regional observation network wells are also shown in the following tables.

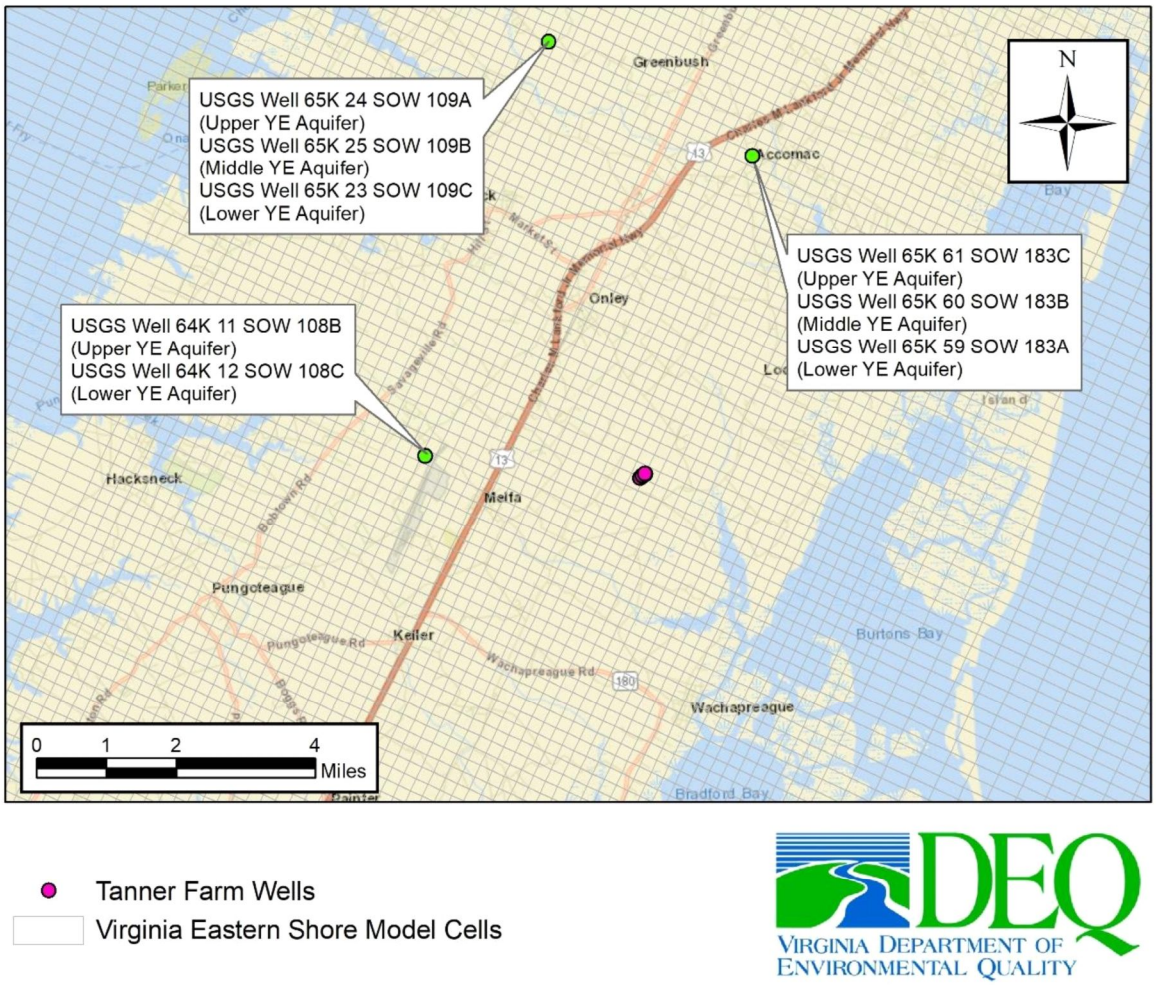


Figure 1. Nearest USGS regional observation network wells.

Comparing the VAHydroGW-ES 2017 Historic Use Water Level with the USGS Network Well 2017 Water Level provides a method for judging the accuracy of the VAHydroGW-ES. Figures 2 through 9 show graphs of the recorded water levels from the USGS observation wells listed in the following tables. These figures also show the simulated VAHydroGW-ES *Historic Use Simulation* water levels for the model cell containing each USGS well. Observing the simulated and observed water elevations together provide a second method for assessing the accuracy of the VAHydroGW-ES in the vicinity of the applicant wells.

The Upper Yorktown-Eastover VAHydroGW-ES 2017 Reported Use Water Level is essentially the same value as the USGS Network Well 2017 Water Level observed in Well 65K 24 SOW 109A. The 2017 VAHydroGW-ES water level is 4 few feet lower than the level observed in Well 64K 11 SOW 108B and 7 feet lower than the level observed in 65K 61 SOW 183C. The water levels observed over the past approximately 40 years in each Upper Yorktown-Eastover USGS well are shown in Figures 2 through 4. The wells exhibit yearly fluctuations in water levels of approximately 2 to 5 feet. Water levels simulated by

the VAHydroGW-ES do not fluctuate in the same manner because the pumping and recharge simulated in the model for any given year are averaged over the year and entered in the model as the average value for the year. Water levels for the USGS Upper Yorktown-Eastover wells are in general agreement with the water levels simulated by the VAHydroGW-ES – especially for Well 65K 24 SOW 109A. While still reasonably accurate, water levels are approximately 3 feet higher for Well 64K 11 SOW 108B and approximately 5 feet higher for Well 65K 61 SOW 183C, over the three to four decades, when compared to those simulated by the VAHydroGW-ES.

The Middle Yorktown-Eastover VAHydroGW-ES 2017 Reported Use Water Levels are 5 feet higher to 8 feet lower than the USGS Network Well 2017 Water Levels observed in Well 65K 25 SOW 109B and Well 65K 60 SOW 183B. The water levels observed over the past 30 to 40 years in the Middle Yorktown-Eastover USGS wells are shown in Figures 5 and 6. Each well exhibits yearly fluctuations in water levels of approximately 2 to 10 feet. Water levels for the USGS Middle Yorktown-Eastover wells are in general agreement with the water levels simulated by the VAHydroGW-ES. Water levels for Well 65K 25 SOW 109B are higher by approximately 5 feet than those simulated by the VAHydroGW-ES over the past 40 years. The fluctuations and general patterns observed in Well 65K 60 SOW 183B are generally simulated by the VAHydroGW-ES. The large spike in the simulated water level at the end of 2012 (observed in Well 65K 60 SOW 183B) is due to a significant reduction in reported pumping for the year 2012 by a large, nearby withdrawal. The absence of a corresponding jump in water levels in the USGS observation wells indicates that the reported pumping amounts for the year 2012 may not have matched the actual pumping in the vicinity of the well.

The Lower Yorktown-Eastover VAHydroGW-ES 2017 Reported Use Water Level is approximately 3 feet lower than the USGS Network Well 2017 Water Level observed in Well 65K 59 SOW 183A; the VAHydroGW-ES 2017 value for USGS Well 65K 23 SOW 109C is approximately 2 feet higher; and the 2017 VAHydroGW-ES water level is approximately 8 feet higher than the level observed in Well 64K 12 SOW 108C. The water levels observed over the past 30 to 40 years in the Lower Yorktown-Eastover USGS wells are shown in Figures 7 through 9. Each well exhibits yearly fluctuations in water levels of approximately 2 to 10 feet. Water levels for the USGS Lower Yorktown-Eastover wells are in general agreement with the water levels simulated by the VAHydroGW-ES. The fluctuations and general patterns observed in Well 65K 23 SOW 109C and Well 65K 59 SOW 183A are generally simulated by the VAHydroGW-ES. Water levels simulated by the VAHydroGW-ES are also in general agreement with those observed in Well 64K 21 SOW 108C – though the observed water levels do decline at a larger rate than those simulated. The same spike outlined in the preceding paragraph is also visible in Well 65K 23 SOW 109C and Well 65K 59 SOW 183A.

Differences between observed and simulated water levels will be noted and addressed during the next calibration of the VAHydroGW-ES.

Upper Yorktown-Eastover Measurements	65K 24 SOW 109A	65K 61 SOW 183C	64K 11 SOW 108B
Distance from applicant wells (miles)	6.4	4.9	3.2
VAHydroGW-ES Row	128	130	161
VAHydroGW-ES Column	33	51	38
VAHydroGW-ES Land Surface Elevation (ft-msl)	13	39	44
USGS Well Land Surface Elevation (ft-msl)	12	35	47
USGS Network Well 2017 Water Level (ft-msl)	5.8	15.4	33.5
VAHydroGW-ES 2017 Reported Use Water Level (ft-msl)	5.7	8.3	29.4
VAHydroGW-ES 2067 Reported Use Water Level (ft-msl)	5.6	8	29.3
VAHydroGW-ES 2067 Total Permitted Water Level (ft-msl)	4.3	4.8	28.3

Middle Yorktown-Eastover Measurements	65K 25 SOW 109B	65K 60 SOW 183B
Distance from applicant wells (miles)	6.4	4.9
VAHydroGW-ES Row	128	130
VAHydroGW-ES Column	33	51
VAHydroGW-ES Land Surface Elevation (ft-msl)	13	39
Land Surface Elevation (ft-msl)	12	35
USGS Network Well 2017 Water Level (ft-msl)	0.2	10.4
VAHydroGW-ES 2017 Reported Use Water Level (ft-msl)	5.3	2.9
VAHydroGW-ES 2067 Reported Use Water Level (ft-msl)	5.2	2.1
VAHydroGW-ES 2067 Total Permitted Water Level (ft-msl)	3.9	-1.7

Lower Yorktown-Eastover Measurements	65K 23 SOW 109C	65K 59 SOW 183A	64K 12 SOW 108C
Distance from applicant wells (miles)	6.4	4.9	3.2
VAHydroGW-ES Row	128	130	161
VAHydroGW-ES Column	33	51	38
VAHydroGW-ES Land Surface Elevation (ft-msl)	13	39	44
Land Surface Elevation (ft-msl)	13	35	47
USGS Network Well 2017 Water Level (ft-msl)	-0.3	-17	12.9
VAHydroGW-ES 2017 Reported Use Water Level (ft-msl)	1.8	-20.4	20.8
VAHydroGW-ES 2067 Reported Use Water Level (ft-msl)	1.5	-20.7	20.6
VAHydroGW-ES 2067 Total Permitted Water Level (ft-msl)	0.1	-20.1	18.9

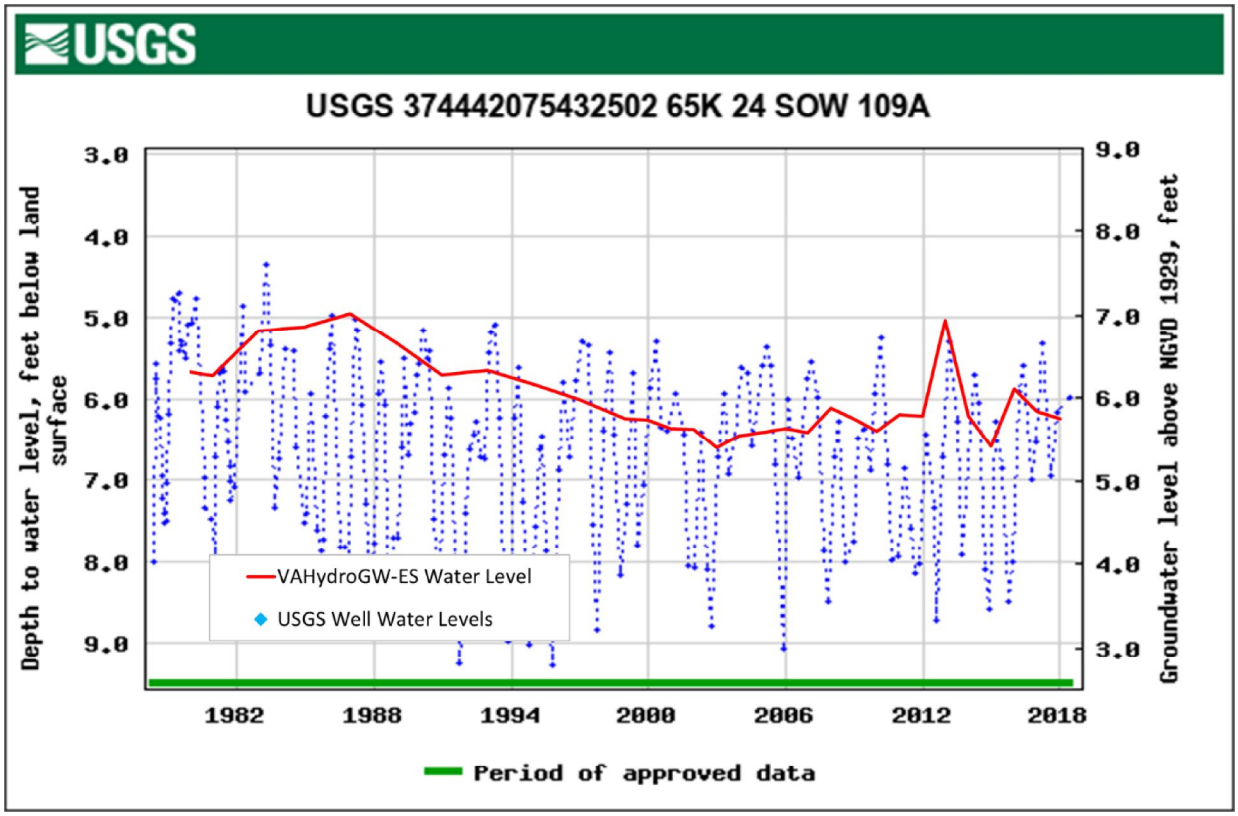


Figure 2. USGS Regional Observation Well 65K 24 SOW 109A, Upper Yorktown-Eastover aquifer water levels recorded from 1978 to present (well depth 130 ft bls, land surface 12 ft msl).

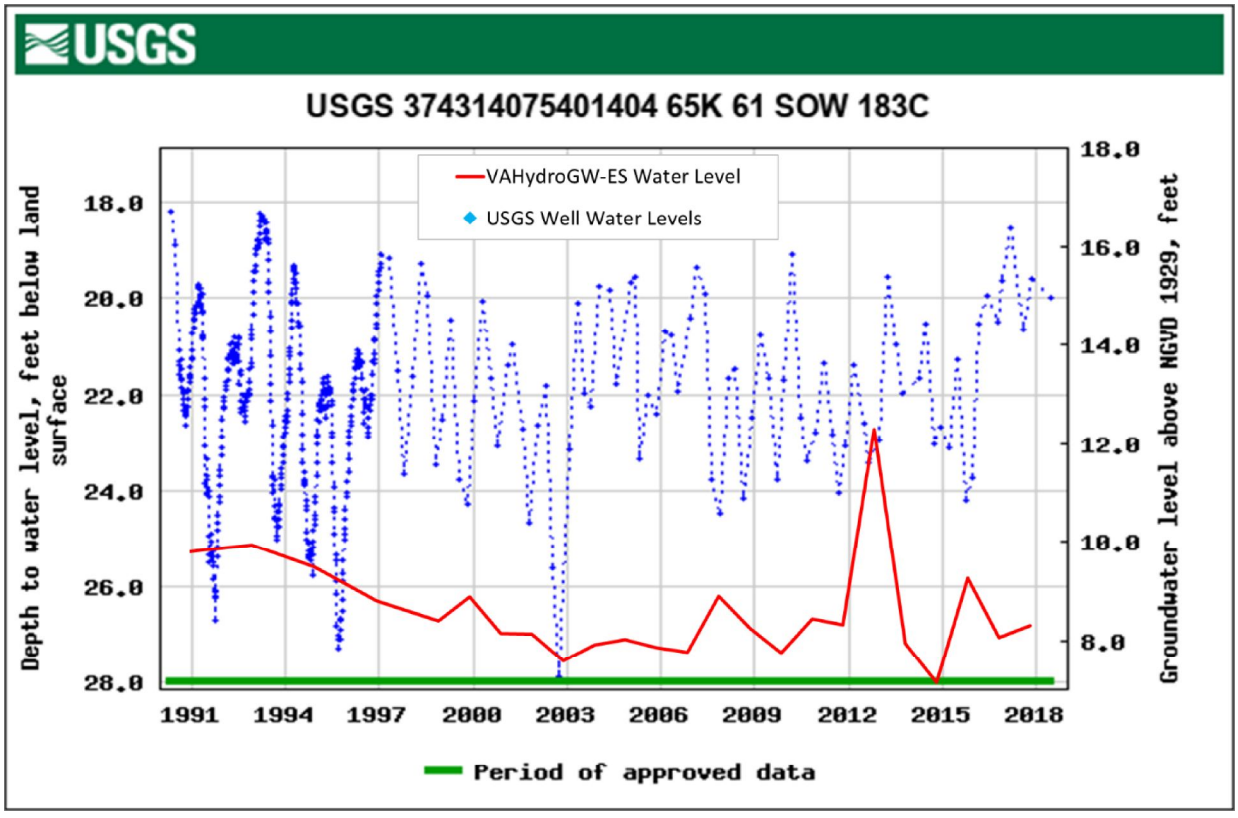


Figure 3. USGS Regional Observation Well 65K 61 SOW 183C, Upper Yorktown-Eastover aquifer water levels recorded from 1990 to present (well depth 135 ft bls, land surface 35 ft msl).

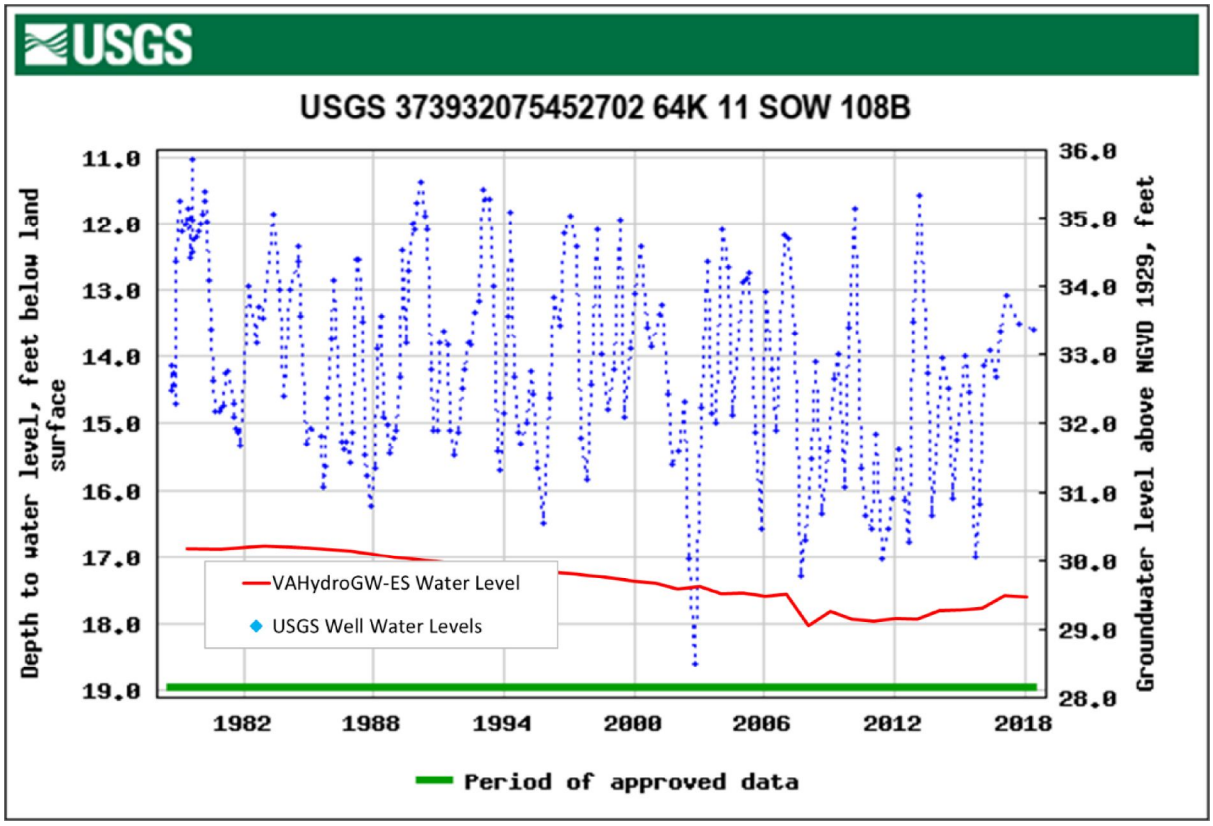


Figure 4. USGS Regional Observation Well 64K 11 SOW 108B, Upper Yorktown-Eastover aquifer water levels recorded from 1978 to present (well depth 180 ft bls, land surface 47 ft msl).

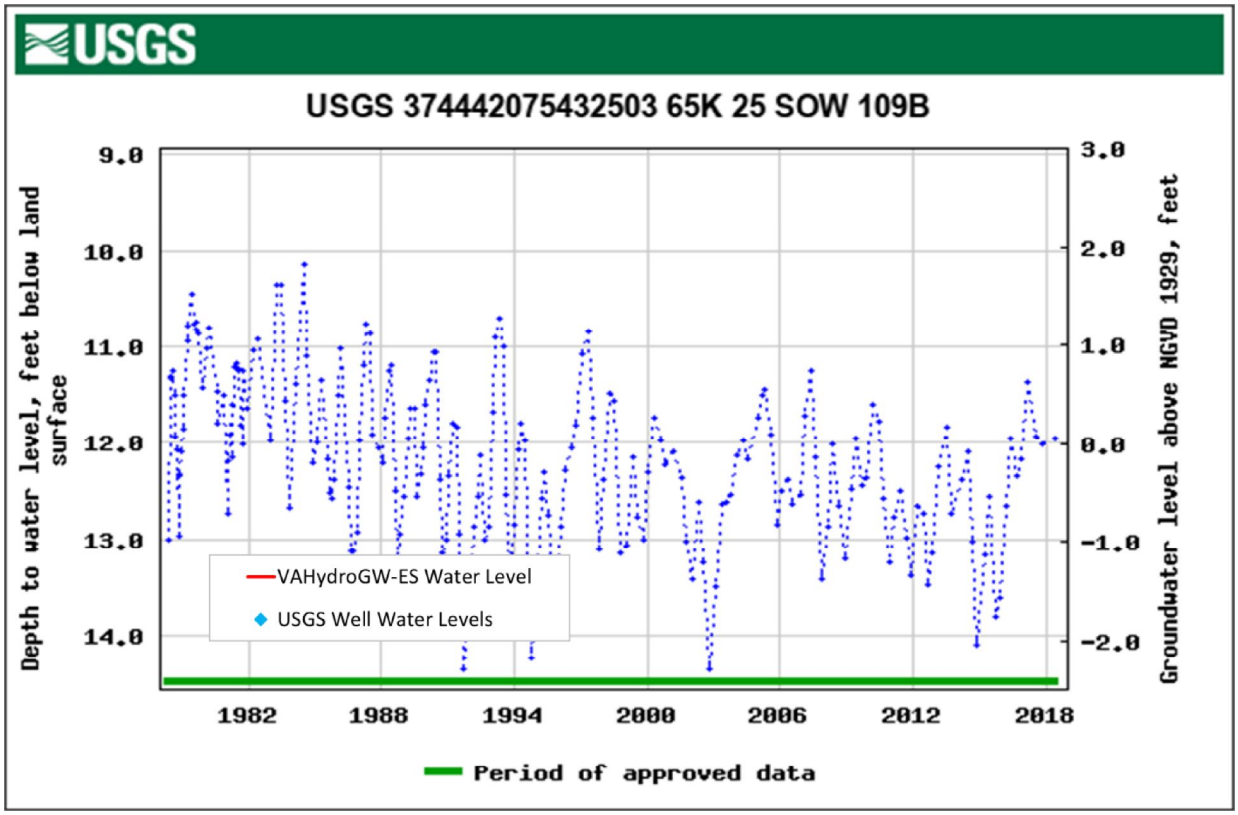


Figure 5. USGS Regional Observation Well 65K 25 SOW 109B, Middle Yorktown-Eastover aquifer water levels recorded from 1978 to present (well depth 228 ft bls, land surface 12 ft msl).

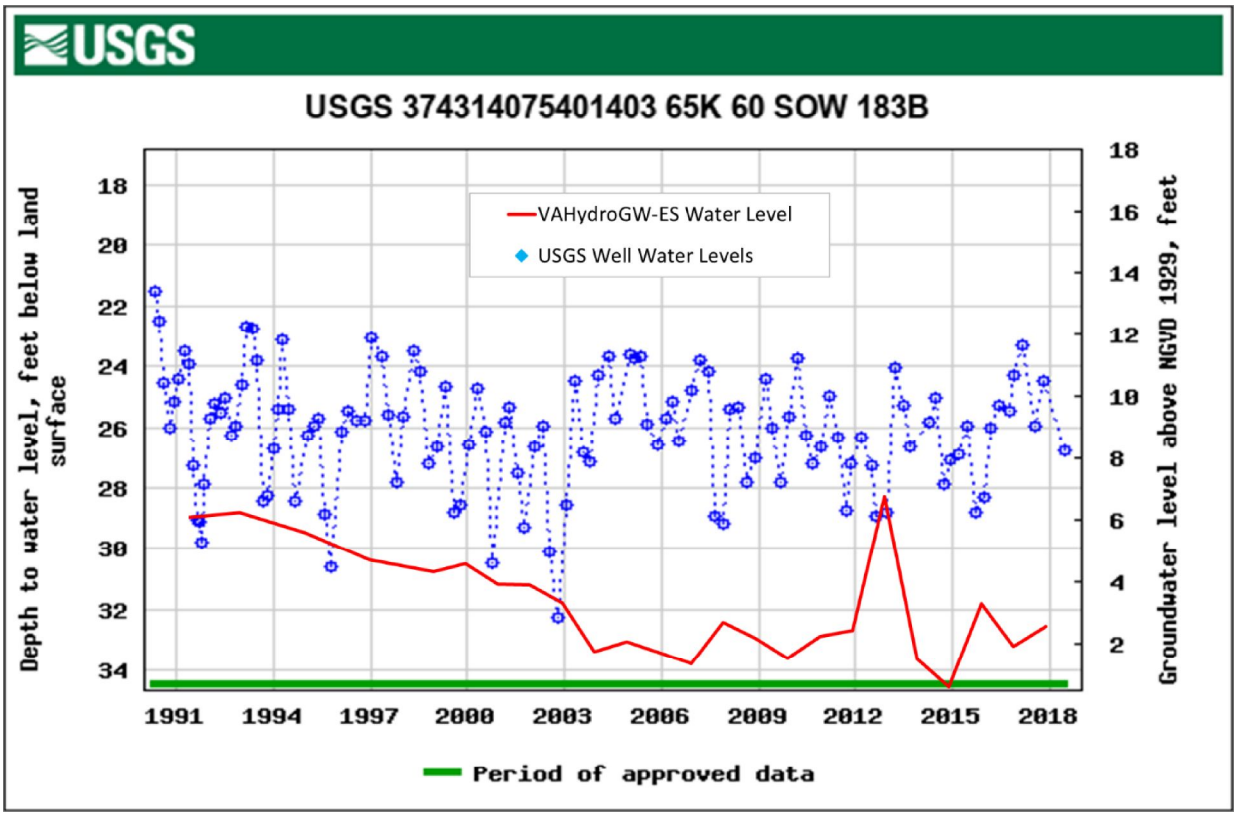


Figure 6. USGS Regional Observation Well 65K 60 SOW 183B, Middle Yorktown-Eastover aquifer water levels recorded from 1990 to present (well depth 235 ft bls, land surface 35 ft msl).

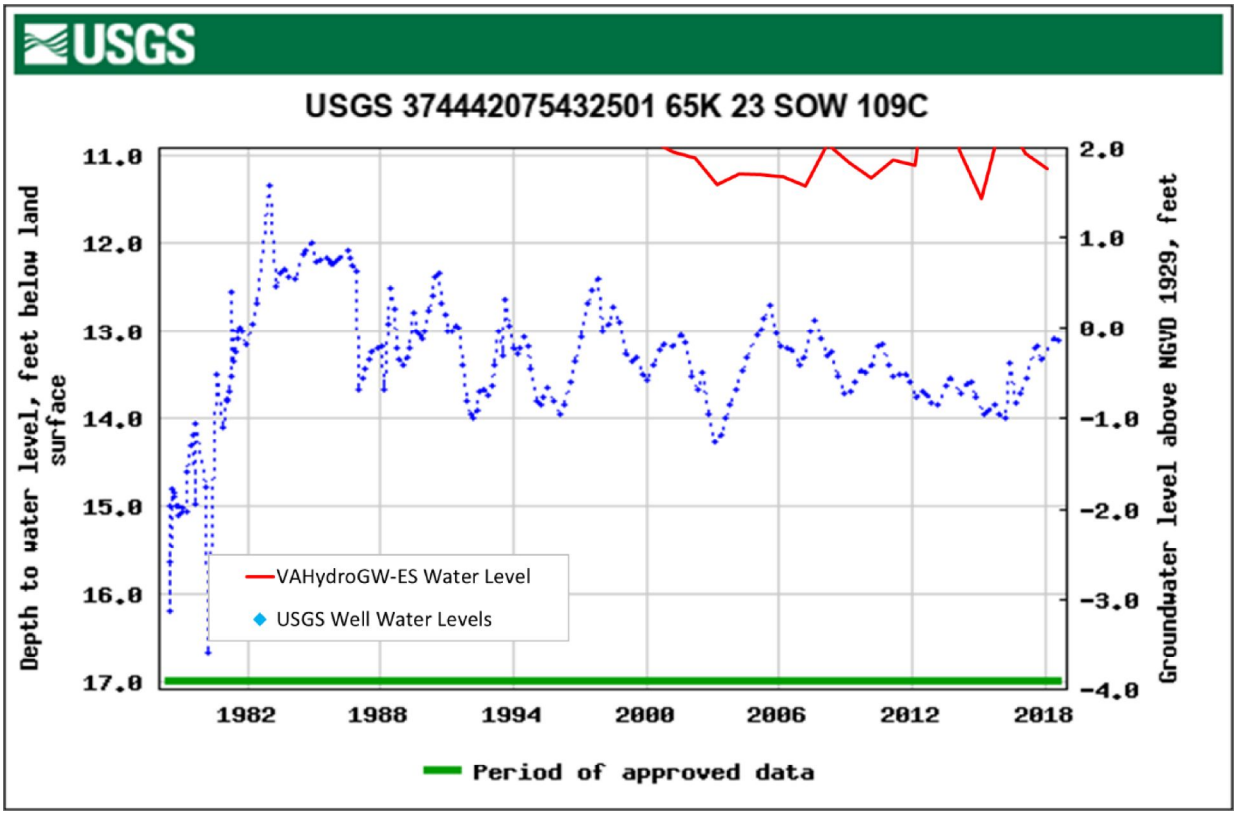


Figure 7. USGS Regional Observation Well 65K 23 SOW 109C, Lower Yorktown-Eastover aquifer water levels recorded from 1978 to present (well depth 290 ft bls, land surface 13 ft msl).

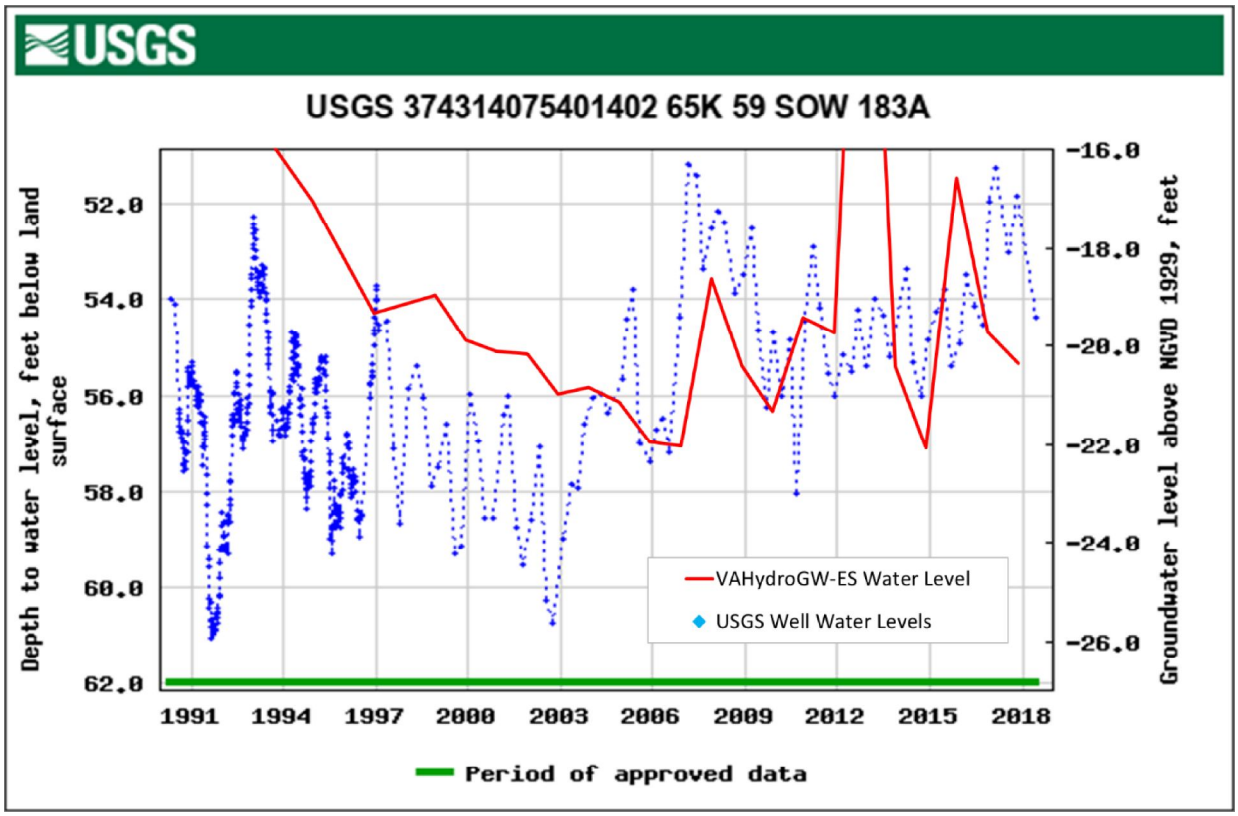


Figure 8. USGS Regional Observation Well 65K 59 SOW 183A, Lower Yorktown-Eastover aquifer water levels recorded from 1990 to present (well depth 285 ft bls, land surface 35 ft msl).

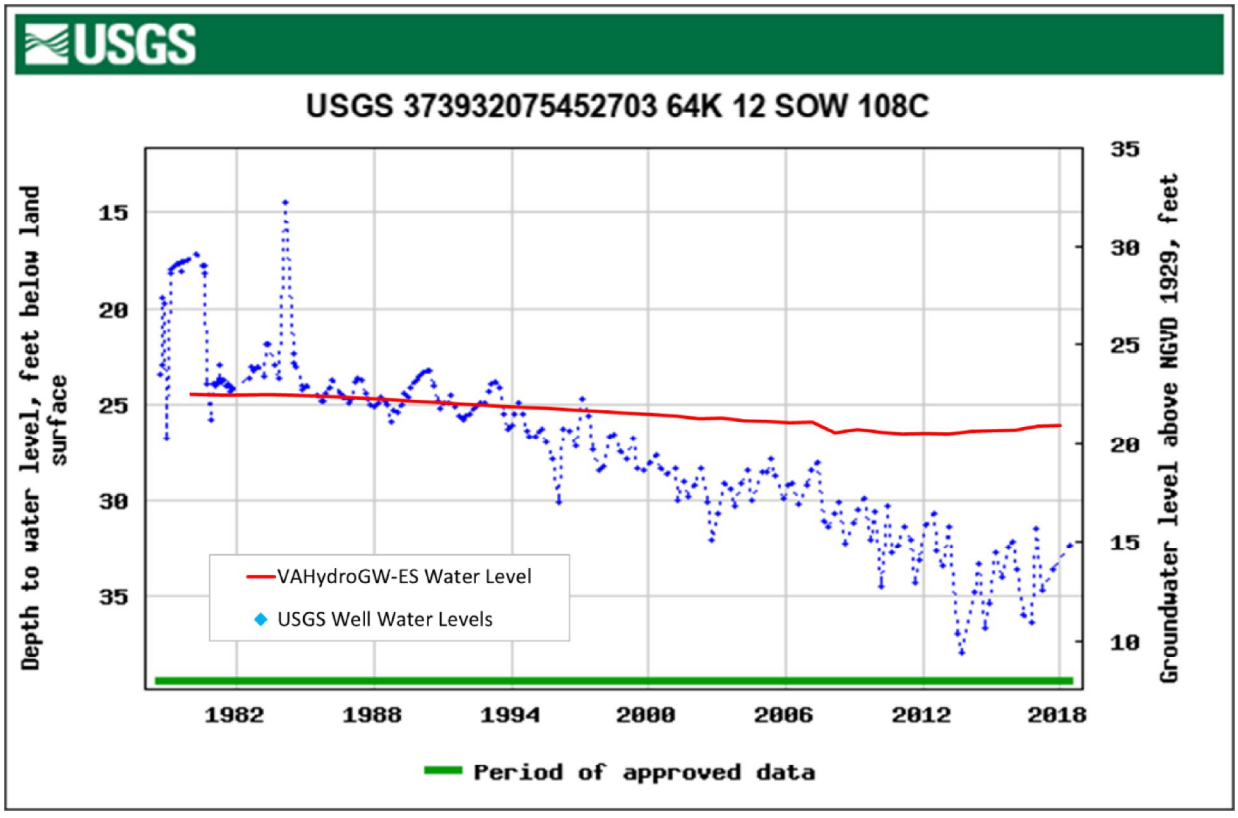


Figure 9. USGS Regional Observation Well 64K 21 SOW 108C, Lower Yorktown-Eastover aquifer water levels recorded from 1978 to present (well depth 284 ft bls, land surface 47 ft msl).

Aquifer Test(s):
An aquifer test has not been conducted for this system and the VAHydroGW-ES model was used to evaluate the application. The following table provides the average hydrogeologic properties assigned to the VAHydroGW-ES cell(s) containing the applicant wells.

Virginia Eastern Shore Model Hydrogeologic Properties: Row 155 & 156/Column 53							
Aquifer	**Top Elevation (feet msl)**	**Top Elevation (feet bls)**	**Aquifer Thickness (feet)**	**Horizontal Conductivity (feet/day)**	**Vertical Conductivity (feet/day)**	**Specific Storage (1/feet)**	**Specific Yield**
Columbia	25	0	50	58	0.5	0.00001	0.15
Upper Yorktown-Eastover	-91	117	47	5	5.4	0.000004	N/A
Middle Yorktown-Eastover	-166	191	46	4	3.9	0.000004	N/A
Lower Yorktown-Eastover	-239	264	75	3	2.7	0.000004	N/A

Model Results

Evaluation of Withdrawal Impacts:
The VAHydroGW-ES model was used to simulate the effects resulting from the proposed withdrawal due to the multi-aquifer impacts. The stabilized effects resulting from the proposed withdrawal were simulated at the annual permitted withdrawal rate of 8,000,000 gallons per year (21,918 average gpd). The stabilized effects were simulated by replacing the reported use amounts in the 2017 VAHydroGW-ES Reported Use Simulation with the current maximum annual withdrawal limit allowed under the terms of their permit for all Ground Water Management Area (GWMA) permit holders. That same simulation was executed twice, once with the proposed withdrawal removed (the *baseline simulation*), and once with the proposed withdrawal added (the *proposed withdrawal simulation*). The stabilized effects of the proposed withdrawal were considered by simulating both simulations for 50 years and observing the difference in water potentiometric levels at the end of the simulations.

Area of Impact:
The area of impact (AOI) for an aquifer is the area where the additional drawdown due to the proposed withdrawal exceeds one foot. The results of the VAHydroGW-ES simulations, outlined in the preceding section, predict areas of impact in the Upper, Middle, and Lower Yorktown-Eastover aquifers. The AOI areas extend a maximum distance of approximately 0.3, 0.6, and 0.3 miles from the production center for the Upper, Middle, and Lower Yorktown-Eastover aquifers. AOI maps for all affected aquifers are attached to this report.

80 % Drawdown:
The 80% drawdown criterion was evaluated for all impacted, confined aquifers in the Virginia Eastern Shore using the VAHydroGW-ES *proposed withdrawal simulation*. The elevations of the top of the Upper, Middle, and Lower Yorktown-Eastover aquifers at the VAHydroGW-ES cell (row 155, column 53) simulating the greatest drawdown are -91, -166, and -239 feet msl, respectively. Based on the results of the *proposed withdrawal simulation* the predicted potentiometric water levels at the same VAHydroGW-ES cell are 13.0, 8.8, and 9.5 feet msl for the Upper, Middle, and Lower Yorktown-Eastover aquifers, respectively. The 80% drawdown criterion allows the potentiometric water level (based on the critical surface elevation calculated from the VAHydroGW-ES data) to be reduced to -69.1, -129.2, and -188.1 feet msl in the Upper, Middle, and Lower Yorktown-Eastover aquifers, respectively. Therefore, the water levels in the VAHydroGW-ES cell containing the applicant wells for each confined aquifer are not simulated to fall below the critical surface. Additionally, no new VAHydroGW-ES cells are simulated to have water levels

fall below the critical surface. Therefore, this withdrawal is within the limits set by the 80% drawdown criterion.

The requested withdrawal is allocated 100% to the Middle Yorktown-Eastover aquifer. The technical evaluation analysis indicated that the apportionment of the requested withdrawal amount among the applicant production wells had no significant effect on the outcome of the technical evaluation.

Water Quality:
The EPA has established the National Secondary Drinking Water Regulations (NSDWRs) which are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic (such as taste, odor, or color) effects in drinking water. The EPA recommends the secondary standards to water systems – states may choose to adopt them as enforceable standards. The EPA NSDWRs specify the limit on chloride as 250 mg/L.

The VAHydroGW-ES was created "to help the Commonwealth and local water managers better plan water use and estimate future changes in water and salinity levels in response to changes in water use."[4] Use of the model to predict future chloride concentrations results in a "general useful understanding of system behavior, but water-resource managers must be careful in trusting the accuracy of predictions at individual wells from a regional model."[5] Further, chloride concentrations at individual wells, predicted using the regional model, should not be relied upon to predict actual concentrations at those locations.

The potential for adverse changes to water quality due to the requested withdrawal was evaluated using transient, density-dependent, SEAWAT simulations using the VAHydroGW-ES. Two simulations were executed – one simulation without the proposed withdrawal included and a second with the proposed withdrawal included. Both simulations were executed for 50 years. And both used the 2017 total permitted stresses, concentrations, and heads as starting conditions. In an effort to simulate the long-term effects on water quality due to the proposed withdrawal, the amount of 8,000,000 gallons per year (21,918 average gpd) was used for the duration of the second simulation. The two simulations were compared to evaluate the potential for adverse changes to water quality. The results indicated that no model cells simulate an increase in chloride concentration greater than 65 mg/L due to the proposed withdrawal. Therefore, the VAHydroGW-ES model results do not indicate the potential for reduced water quality as a result of the proposed withdrawal.

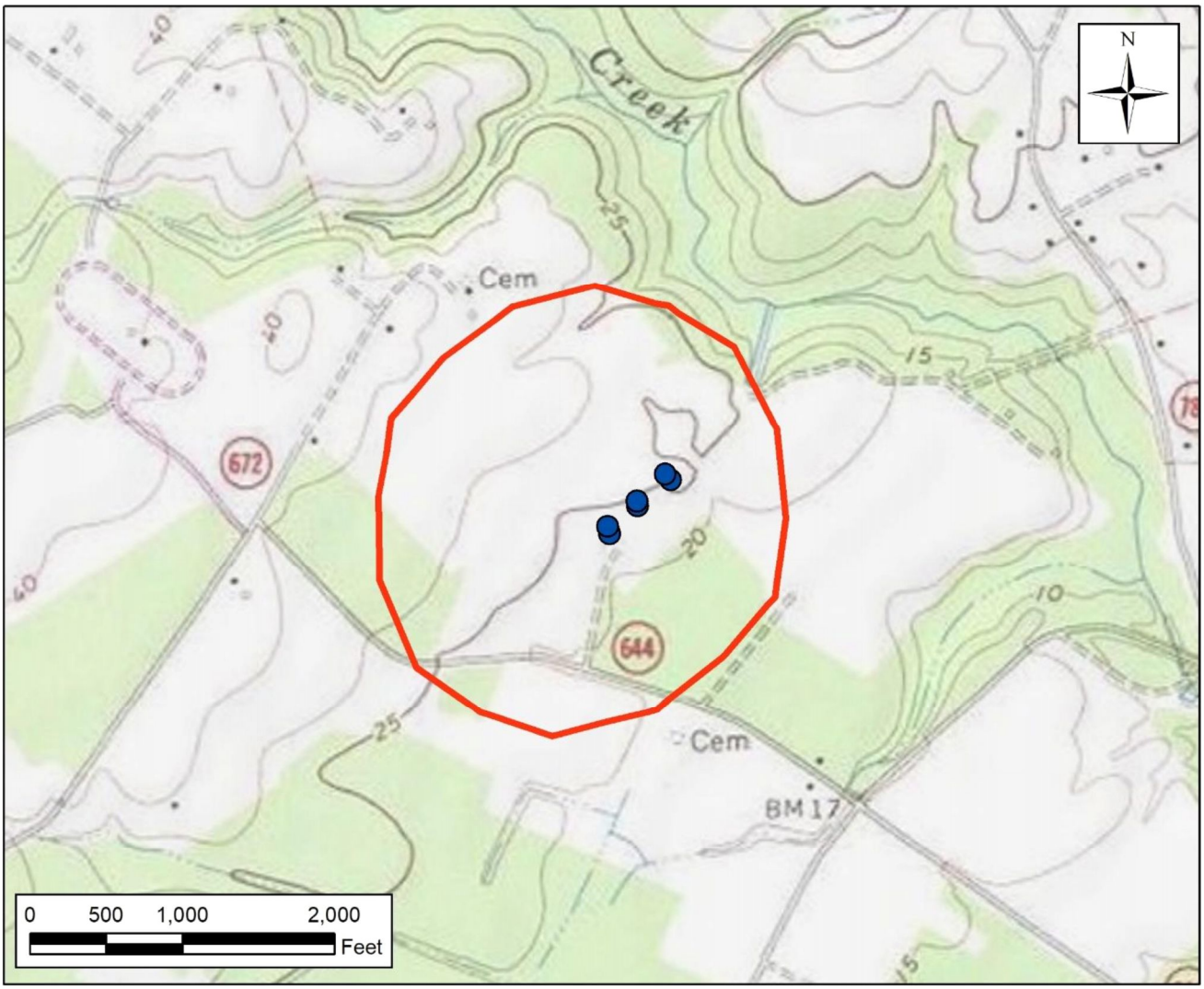
Conclusion:
The withdrawal requested by Goodman Poultry Farms, LLC for the Tanner Farm withdrawal satisfies the technical evaluation criteria for permit issuance. The AOIs for the Upper, Middle, and Lower Yorktown-Eastover aquifers are shown in the following maps. The existing permitted wells located within the applicant's AOIs are listed in the following tables.

[4] Sanford, W.E., Pope, J.P., and Nelms, D.L., 2009, Simulation of groundwater-level and salinity changes in the Eastern Shore, Virginia: U.S. Geological Survey Scientific Investigations Report 2009–5066, 125 p.
[5] Sanford, W.E. and Pope, J.P., 2009, Current challenges using models to forecast seawater intrusion: lessons from the Eastern Shore of Virginia, USA. Hydrogeology Journal (2009), Volume: 18, Issue: 1, p: 73-93

Middle Yorktown-Eastover Aquifer – Existing Permittees within the Tanner Farm AOI

Permittee	Permit	Well	Latitude	Longitude
Shore Time Poultry LLC	GW0075900	100-01371	37.657500	-75.701111
	GW0075900	100-01372	37.657250	-75.701694
	GW0075900	100-01373	37.657056	-75.702083
	GW0075900	100-01374	37.656861	-75.702639
	GW0075900	100-01375	37.656667	-75.703056
	GW0075900	100-01376	37.656472	-75.703444
	GW0075900	100-01377	37.656194	-75.703861
	GW0075900	100-01378	37.656000	-75.704278
	GW0075900	100-01379	37.655806	-75.704667
	GW0075900	100-01380	37.655667	-75.705056
	GW0075900	100-01381	37.655444	-75.705389
	GW0075900	100-01382	37.655111	-75.705528
Brittany Poultry Farm LLC	GW0077800	100-01665	37.655526	-75.693250
	GW0077800	100-01666	37.655225	-75.692927
	GW0077800	100-01667	37.654995	-75.693858
	GW0077800	100-01668	37.654668	-75.693440
	GW0077800	100-01669	37.654137	-75.694448
	GW0077800	100-01670	37.654137	-75.694082

Tanner Farm
Area of Impact - Upper Yorktown-Eastover Aquifer



Tanner Farm Wells

Upper Yorktown-Eastover Aquifer Area of Impact

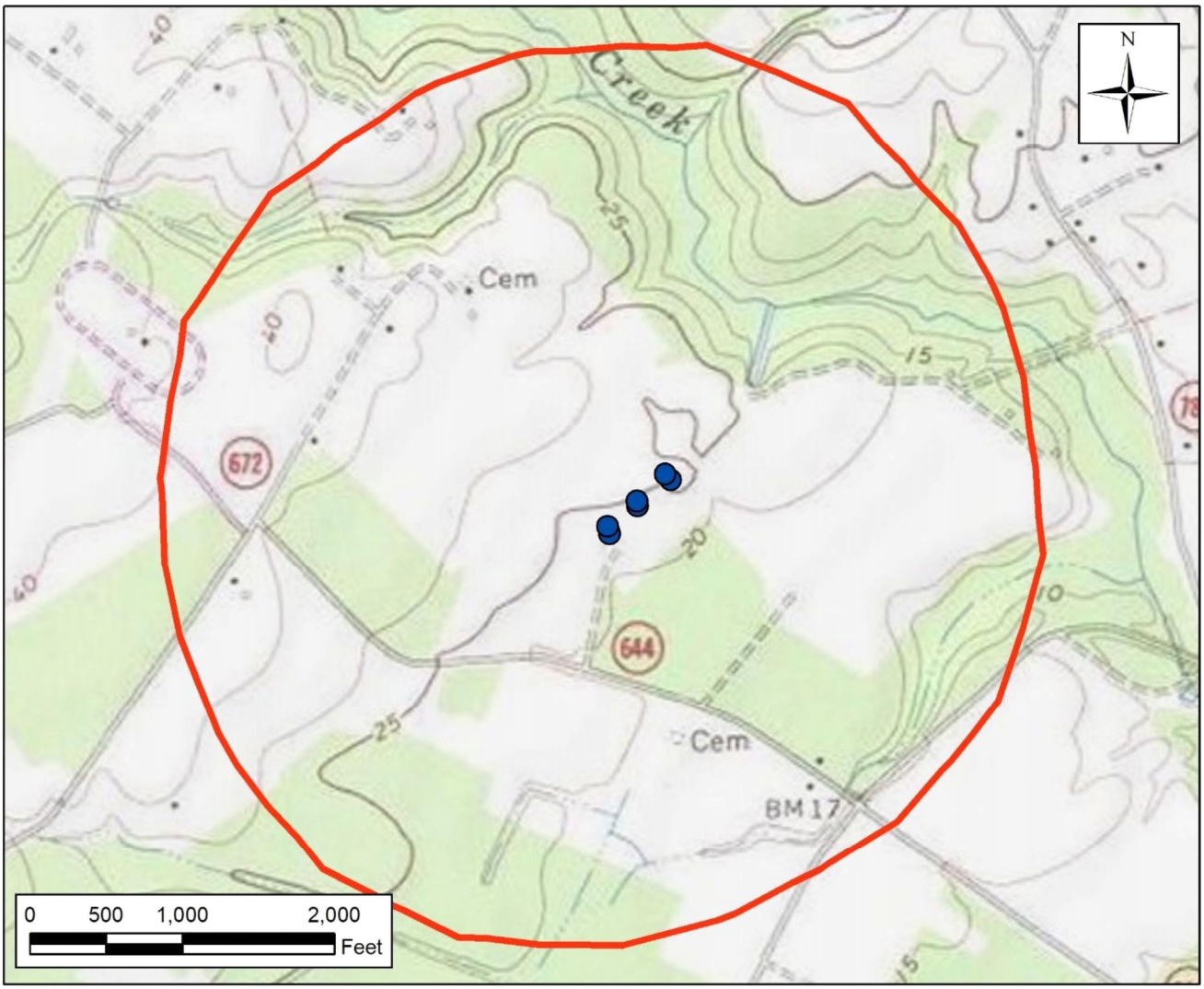
Simulated drawdown at or exceeding one foot in the Upper Yorktown-Eastover aquifer resulting from a 8,000,000 gallons per year (21,918 average gpd), 50 year withdrawal from the Middle Yorktown-Eastover aquifer using the VAHydroGW-ES.

Maximum radius of one foot drawdown (Area of Impact) extends approximately 0.3 miles from the pumping center.

Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply
December 14, 2018

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Tanner Farm
Area of Impact - Middle Yorktown-Eastover Aquifer



Tanner Farm Wells

Middle Yorktown-Eastover Aquifer Area of Impact

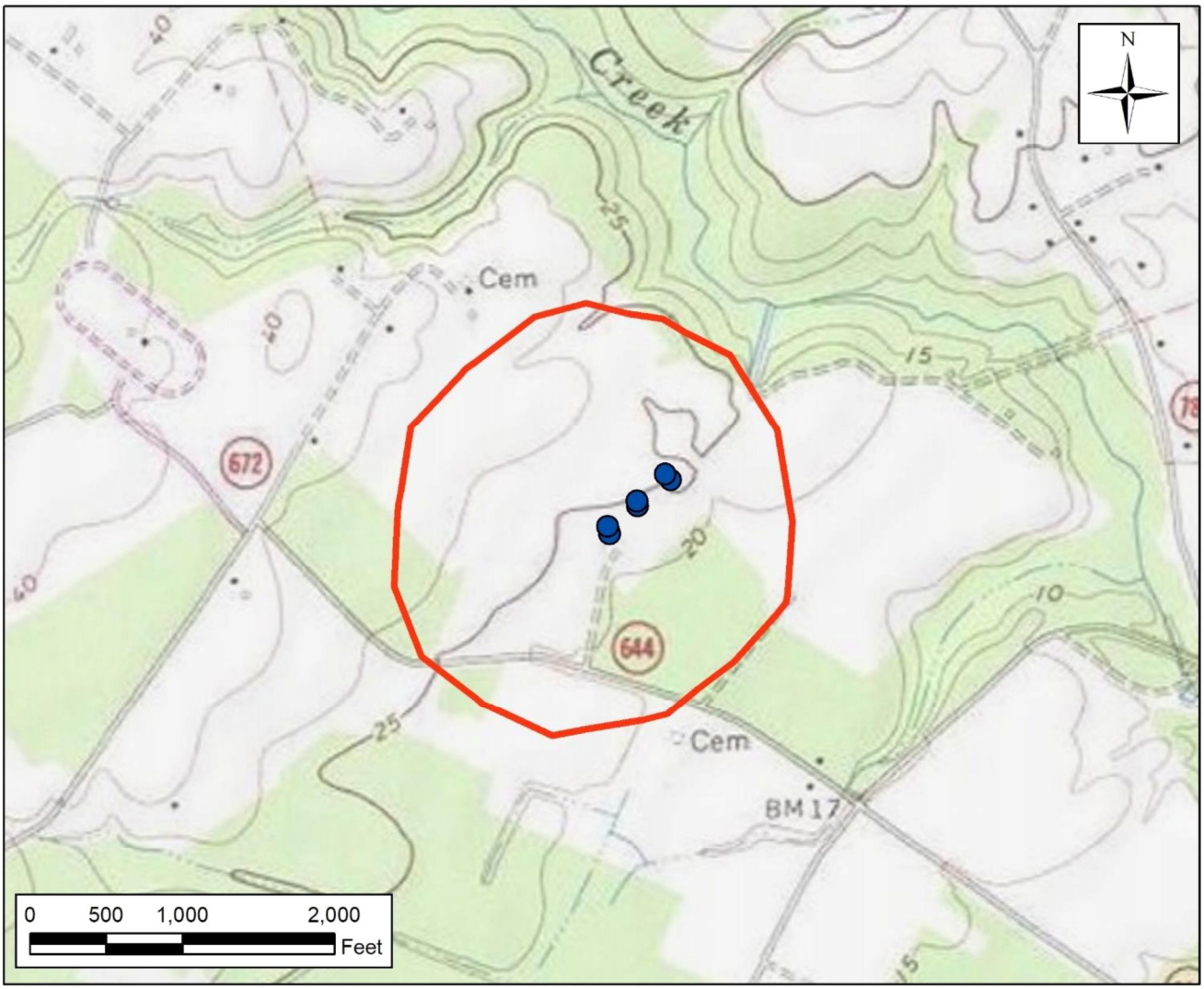
Simulated drawdown at or exceeding one foot in the Middle Yorktown-Eastover aquifer resulting from a 8,000,000 gallons per year (21,918 average gpd), 50 year withdrawal from the Middle Yorktown-Eastover aquifer using the VAHydroGW-ES.

Maximum radius of one foot drawdown (Area of Impact) extends approximately 0.6 miles from the pumping center.

Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply
December 14, 2018

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Tanner Farm
Area of Impact - Lower Yorktown-Eastover Aquifer



Tanner Farm Wells

Lower Yorktown-Eastover Aquifer Area of Impact

Simulated drawdown at or exceeding one foot in the Lower Yorktown-Eastover aquifer resulting from a 8,000,000 gallons per year (21,918 average gpd), 50 year withdrawal from the Middle Yorktown-Eastover aquifer using the VAHydroGW-ES.

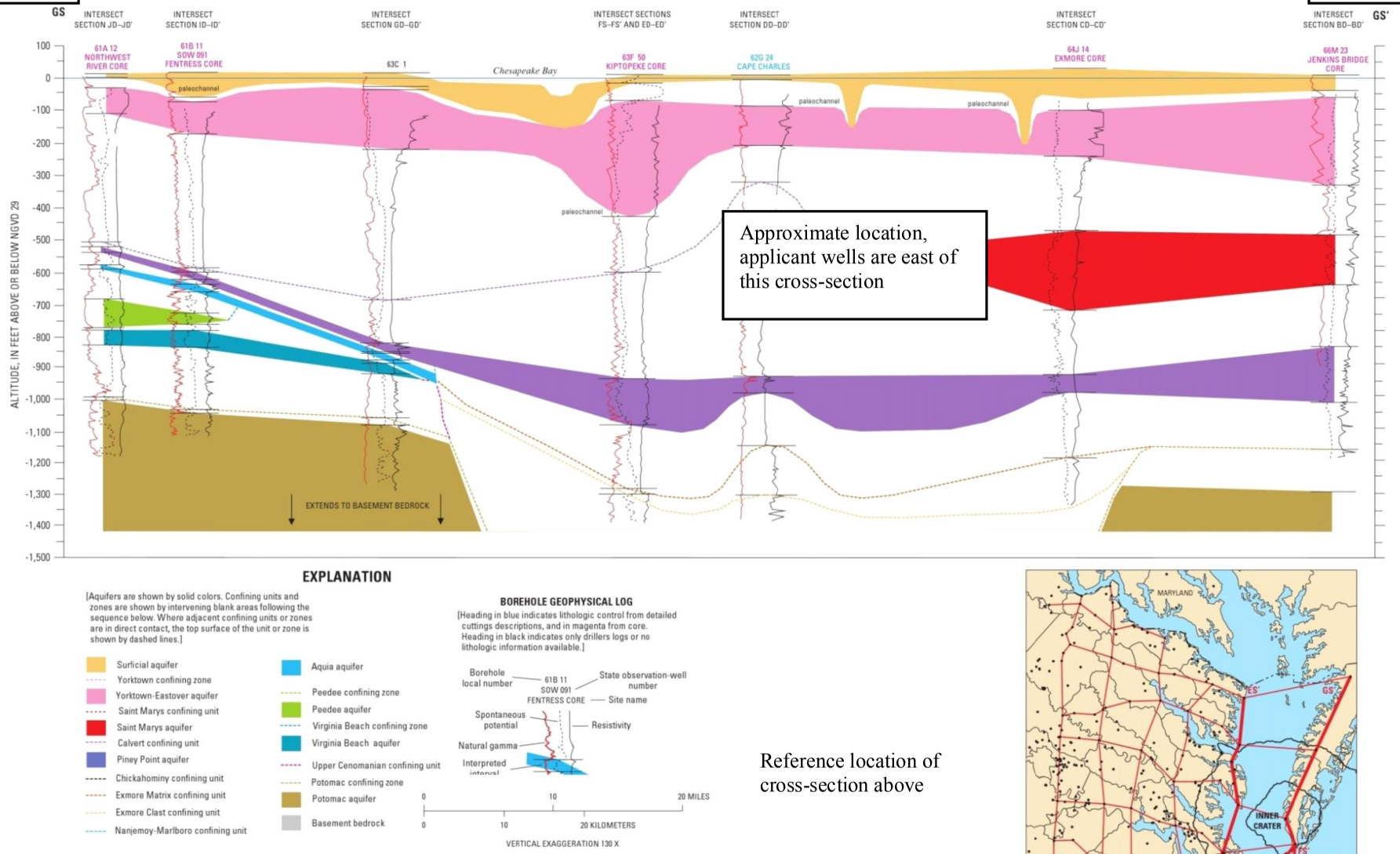
Maximum radius of one foot drawdown (Area of Impact) extends approximately 0.3 miles from the pumping center.

Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply
December 14, 2018

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

SOUTH

NORTH



Reference location of cross-section above

Coastal Plain (2006) Cross-Sections GS-GS' from USGS Professional Paper 1731.